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DATA COMPILATION FOR PARTICLE IMPACT DESORPTION

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Data Compilation for Particle Impact Desorption

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Tokai Research Establishment, JAERI

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The desorption of gases from solid surfaces by incident electrons, ions and photons is one of the important processes of hydrogen recycling in the controlled thermonuclear reactors. We have surveyed the literature concerning the particle impact desorption published through 1983 and compiled the data on the desorption cross sections and desorption yields with the aid of a computer. This report presents the results obtained for electron stimulated desorption, the desorption cross sections and yields being given in graphs and tables as functions of incident electron energy, surface temperature and gas exposure.

Keywords: Data Compilation, Plasma-Wall Interaction, Electron Stimulated Desorption, Desorption Cross Section, Desorption Yield. Literature, Survey

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粒子衝撃脱着に関するデータ収集

日本原子力研究所東海研究所・原子分子データ研究委員会
押山　孝＊・永井　士郎・小沢　国夫・竹内　富士雄＊＊

（１９８４年４月２３日受理）

電子・イオン及びフォトン衝撃による固体表面からの気体の脱着は，核融合炉におけるプラズマ壁相互作用の重要な素過程の１つであり，種々の気体／固体表面の組合せに関するデータ収集が要請されている。本報告は上記脱着に関する１９６１～１９８３年まで公刊された文献を調査して，脱着断面積及び脱着収率に関するデータの収集・評価を行った。電子衝撃による脱着については，入射電子エネルギー，固体表面温度及びガスの種類の関数として，グラフ及び，数値表としてまとめてある。イオン及びフォトン衝撃による脱着に関する文献は付録として巻末に収録した。

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＊＊　京都産業大学計算機科学研究所

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1. Introduction

When energetic particles impinge on solid with the surfaces which are covered with adsorbate layer, ions, neutrals, and/or excited neutrals are released. This process is the so-called particle impact desorption. The desorption is one of the important processes of the hydrogen recycling in the controlled thermonuclear reactors, and the desorption data are needed on various gas/solid surface combinations.

This report presents a compilation of the experimental data on the cross sections and yields of Electron Stimulated Desorption (ESD), which depend on various parameters such as incident energy, temperature, adsorption binding state and substrate. A survey has been made of the literature published between 1961 and 1983. The data on desorption cross sections and yields are compiled and stored in the DEC 2060 System of Kyoto Sangyo University. These data are classified for different adsorbate-substrate combinations and shown in the figures as functions of the incident electron energy, surface temperature and gas exposure. A data list is attached to each figure. The references, from which the data are adopted, are listed at the end of this report. Our work on data compilation for Ion Impact Desorption (IID) and Photon Stimulated Desorption (PSD) are in progress, bibliographies of IID and PSD being listed in Appendices.

2. Electron Stimulated Desorption

2.1 Mechanisms

A very carefully controlled experiment on ESD was first carried out by Moore in 1961[1]; He investigated O^+ ions emitted from CO adsorbed on Mo and W surfaces. The rate of liberation of the ions has been found to be linearly proportional to the electron-bombardment current. In addition, it was found that the ejected ions have the most probable kinetic energies as high as 8 eV. Some possibilities to explain the phenomenon can be considered; i.e., direct momentum transfer from the incident electron to the adsorbate, electron excitation and dissociation of the adsorbate. In the range of electron energies usually employed in the studies of ESD, the direct energy transfer to adsorbate nucli cannot be responsible for the desorption. The calculation based on the classical theory shows that the maximum energy transferred to a free H atom, for example, is only 0.1 eV for 100 eV electrons whereas the binding energy for chemisorbed H atom is an order of 2.5 eV. If there are weakly bound molecules(physisorption) present on the surface, however, it is conceivable that a fraction of them could be removed by the direct energy transfer. The desorption cross section for physisorbed molecules would be as high as the ionization cross section of gas phase molecules, $\sim 10^{-16} cm^2$, although only a few examples of such high cross section are found in the present data compilation.

Based on theories of the electronic excitation and dissociation of gas molecules, Menzel and Gomer[2], Redhead[3] have independently proposed detailed mechanisms for ESD, which have since gained considerable support from experimental results. Their models are based on the Franck-Condon principle, which states that the nuclear seperation and relative velocity are unchanged during an electronic transition in a molecule. An adsorbate is first excited by an incident electron through a Franck-Condon type of transition from a bound state to an ionic anti-bonding state. This ion formed at the repulsive part of the final state will move away from the surface, gaining kinetic energy and may desorb as an ion. However, not all the ions formed by this mechanism are able to escape from the surface. Some of them may be recaptured by the surface and other may desorb as neutrals after neutralization of ions.(Auger deexcitation or resonance neutralization)

The two independently proposed models were basically the same but have some difference in mechanism for desorption of neutral species. Redhead assumed that all the desorbed species were first excited through a Franck-Condon principle to an ionic anti-bonding state as discussed above. Menzel and Gomer allowed for a direct excitation to anti-bonding state without going through an intermediate ionic state. Menzel[4] has obtained an experimental result supporting that neutrals may be desorbed directly by an electronic excitation under incident electrons with low energy. This mechanism has also been supported by the results by Nishijima and Propst[5], and Madey et al.[6]. Brening[7] has developed a quantum mechanical formulation for ESD which agrees in the classical limit with Redhead's and Menzel and Gomer's formulation for ESD of ions. His theory, however, forbids neutral desorption through an intermediate ionic state.

A different approach to understanding of ESD has been presented by Knotek and Feibelman[8] in 1978. They observed some noble features of desorption from metal oxides such as WO_3 and TiO_2. The first observation of them is that most of the anion species oxygen are desorbed from the surface as a positive ion. The second is that the desorption of the positive ions has a threshold at the core-level ionization potential of either the desorbed atom or its bonding site atom. Knotek and Feibleman has proposed a core hole Auger decay model in order to explain these results. When a core hole is created in the highest occupied level of the metal cation, the main decay channel for a hole is believed to be an interatomic Auger transition because of the absence of higher lying electrons on the cation. i.e., the cation is nominally ionized down to the noble gas configuration.(maximal valency ionic compound) As a consequence, two or three electrons from an anion are removed and oxygen atom will suddenly find itself in a strongly repulsive Madelling potential, resulting in the desorption of positively charged oxygen. The neutralization probability is quite low during the desorption of O^+ because there are no valence electrons on the metal cations. In cases where there are valence electrons left on the metal cations, a probability of O^+ desorption is reduced due to charge trasfer from the metal cation to the anion. It is consistent with the experimental results that ESD yields from materials called submaximal compounds such as WO_2 and Ti_2O_3 are lower than those from maximal valency compounds as WO_3 and TiO_2. Franchy and Menzel[9] have

next year shown that the core hole Auger decay model can be successfully explain the desorption of ions from a covalently bonded adsorbate. Their observation is that electron impact-induced ionization of C 1s and O 1s core levels of CO adsorbed on W (100) leads to desorption of CO^+ and O^+, respectively. An Auger decay of a core-hole in a covalent system results in a two- or three-valence-hole final state which brings about an effective hole-hole repulsive force. This is called a "Coulomb explosion" as had been observed in gas phase molecules where the highly repulsive final state results in the production of ionic fragements of the parent species.

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2.2 Experimental Techniques[1)]

The experimental methods employed in the studies of ESD may be divided into two categories. The first method is one to detect of any measurable changes in the physical or chemical properties of a surface bombarded by electrons, for instance, change in surface work function, low energy electron diffraction(LEED) patterns and Auger intensity. The second is the method to detect directly ions, neutrals and metastables released from a surface upon electron bombardment. In most of the experiments, measurements are performed using apparatuses capable of reaching ultrahigh vacuum, with base pressures $< 10^{-9}$ Torr. This is necessary to avoid an adsorption of impurities on the sampl surface during the time of measurements. A low density and low power electron beam must be used for ESD experiments because of "surface heating" effect produced by electron bombardment. So long as ESD of ions is considered, however, the distinction between ESD and surface heating desorption(thermal desorption) is not so serious problem, because heating seldom leads to ion production. On the other hand, any results obtained for ESD of neutrals must be carefully analyzed owing to the high sensitivity to temperature.

Desorption processes can be expressed by a first order equation with respect to the number of adsorbed species. The rate of change of coverage N [adsorbed species/cm^2] due to bombardment by electrons of flux n[electrons/cm^2/sec] is

$$-\frac{dN}{dt} = n Q N \quad , \tag{1}$$

where Q[cm^2] is the total cross section for all the electron impact-induced processes. N corresponds to the coverage of species in the particular binding state which is affected by ESD. Integration of eq.(1) gives

$$\frac{N(t)}{N_0} = \exp\left(-\frac{JQ}{e} t\right) \quad , \tag{2}$$

where J[A/cm^2] is the current density, e[C] the electronic charge and N_0 is the initial coverage. Two basic approaches are suggested from eq.(2) to determine the total cross section Q. One is to plot logarithmically the decay of coverages with time, i.e., from the slope of the line, the

cross section is obtained. Another way is the direct measurement of coverage N(t) as well as the initial coverage N_0, which is very difficult to know exactly and can be estimated only for a few well-defined systems. The former is more accurate than the latter, since estimations of coverage are not necessary for the former. The cross section Q in eqs.(1) and (2) includes all processes which result in depletion of the population of the species affected by ESD. Such processes include an electron-induced conversion from one binding state to another as well as desorption of ions, neutrals and metastables. It should be, therefore , emphasized that the total cross section obtained from eqs.(1) and (2) does not always correspond to the desorption cross section. It is also suggested from eq.(2) that any quantity related linearly to N can be used directly to obtain the total cross section. Some examples of determination of the total cross section based on eq.(2) are outlined in the following section.

2.2.1 Methods Based on Changes in Surface Properties

Several electron emission processes have been used to study the structure of an adsorbate-covered surface. In order to achieve a strong electronic field, 5×10^7 [V/cm] at several kilovolts, the emitter or cathode is usually etched to a sharp point(about 1000 A in radius). Fowler and Nordheim calculated the emitted currents from a free electron metal with work function ϕ . Their expression for field emitted current i has the form

$$\ln(i/V^2) = \ln A - B \phi^{3/2}/V \quad , \qquad (3)$$

where A and B are constants and V is voltage. A plot of $\ln(i/V^2)$ vs (1/V) yields a straight line of slope $m = B\phi^{3/2}$. If the work function ϕ_c of the clean surface is known, the work function ϕ of the surface with an adsorbed layer can be determined from the following relation,

$$\phi = (m/m_c)^{2/3} \phi_c \quad , \qquad (4)$$

where $m_c = B\phi_c^{3/2}$.

The work-function coverage relation has been demonstrated to be linear

for adsorbed gases in particular binding sates on single-crystal metal surfaces. This relation will be assumed to be generally true for the the small coverage change irrespective of gases and substrates. Then

$$\Delta \phi = \phi - \phi_c = k N \qquad (5)$$

where ϕ is the work function of the surface containing N adsorbates. The work function change $\Delta\phi_0$ at the initial coverage N_0 is measured prior to the ESD. Since the work function change $\Delta\phi$ at coverage N(t) can be obtained from eq. (5), we write

$$\Delta\phi / \Delta\phi_0 = N(t)/N_0 \qquad (6)$$

In comparison with eq.(2), it is clear that the cross section Q is determined from $\Delta\phi$.

Zingerman and Ishchuk[2] used a retarding potential technique to measure work-function changes accompanied with ESD of oxygen from W (100) and W (110).

Changes in the amplitude of Auger spectra, electron-reflection coefficient and LEED patterns and intensities can be also studied as a function of time or coverages. In AES method, it is usual to use the peak-to-peak height in the derivative spectrum as a measure of the amount of an element at the surface. The shape of the derivative spectrum, however, is very sensitive to the states of adsorbates. Thus, no change in the shape must be observed during the measurment of the peak-to-peak height. Otherwise, the peak-to-peak heights are not proportional to the coverages. Lambert and Comrie[3] studied CO adsorption on Pt using Auger analysis with high-energy primary beams and have shown that the secondary electrons from the substrate are the main cause for ESD. This may explain to some degree why the values of total cross section at high energy of primary beams are comparable to those obtained at lower energies.

Low-energy electron diffraction(LEED) studies have revealed some striking effects of low-energy electron bombardment. For example, the intensity of extra spots due to NH_3 adsorbed on W (100)[4] becomes weak during electron bombardment. The kinetics of the ESD process can be inferred from the decay of the intensity with time.

2.2.2 Methods Based on Direct Detection of Desorbed Species

There are two different techniques for the measurements of desorbed ions: (1) mass spectrometric analysis of the ions released upon ESD (2) measurement of ion currents produced by ESD (no mass analysis). The desorption of neutrals can be observed by measuring total and partial pressure changes. Neutral species, in almost cases, is ionized by an electron beam in the normal manner. For excited or metastables, which are very reactive, a time-of-flight technique[5] is used. However there is only a few reliable experimental data concerning the ESD of neutrals.

Quadrupole mass analyzers have employed by a number of investigators to detect desorption products. In practice, ions emitted from the target passed through the grids, of which potentials were chosen to prevent ions formed in the gas phase from reaching the entry of quadrupole mass analyzer. Ions are focussed along the central axis of mass analyzer to the cathode of an electron multiplier detectors.

Lichtman and co-workers[6] have studied on the ESD using a highly sensitive mass spectrometer, which consists of 60° magnetic sector and a 14-stage multiplier detector[Electron Probe Surface Mass Spectrometer]. Ion currents as low as 10^{-20} A arriving at the multiplier can be detected, so that a low current density beam can be used as a primary beam. The power level in this beam is only several microwatts per square centimeter producing negligible thermal effects. Neutral gas molecules thermally desorbed by heating the target can be also detected using an auxiliary ionization chamber.

All the above mentioned instruments employing multiplier detectors, are highly sensitive and provide mass identification of ions or neutrals produced. However, neither the ion-transmission probabilities and sensitivities of the analyzer-detector systems nor the angular distribution of the ejected ions are generally known. Thus, an unknown fraction of the total ejected ions are generally detected. An attempt[7] has been made to collect all the ions liberated from the bombarded surfaces. An apparatus designed for such measurements generally consists of a hemisherical positive ion collector with a few negatively biased concentric hemisherical grids, which surround the Specimen. In addition to the measurement of total-ion current, it is usually able to measure the distribution of kinetic energy for ions,

a measurement of which has contributed significantly to the understanding of mechanism of ESD. Madey and Yates[8] have coupled a mass analyzer with a hemisherical analyzer in order to detect both mass and energy analysis of desorbed ions. Nishijima and Propst[9] have employed a cylindrical magnetic spectrometer for ESD. Their apparatus was especially designed to have a high energy and mass resolution.

The ion current i produced in ESD is directly proportional to the electron-bombardment current I_e and the number of adsorbed species N. Then we write for ionic desorption,

$$i = I_e Q^+ N \quad . \tag{7}$$

where Q^+ is the cross section for ionic desorption. The quantities i and I_e are easily measued by the apparatuses discussed above. If N is known, Q^+ can be measured directly. The coverage N is the concentration of species in a particular binding state which may be in many cases a small fraction of the total quantity of adsorbate. This makes unequivocal determination of N difficult. Thus the quantity i/I_e is frequently measured, which indicates the desorption efficiency, i.e., the numbers of ions released per an incident electron. Ion yields are proportional to coverages as well as the cross sections as shown in eq. (7). It should be mentioned that the determination of the ion yield requires knowledges of pumping speed, system volume and detection efficiency. Substituting eq.(7) into eq.(1), we get

$$-\frac{di}{dt} = n Q i = \frac{J}{e} Q i \quad . \tag{8}$$

Integration of eq.(8) yields

$$\frac{i}{i_0} = \exp(-\frac{JQ}{e} t) \quad . \tag{9}$$

Equation (9) has precisely the same functional form as eq.(2), so that the total cross section Q can be also determined by measuring the time constant of the exponential decay of i.

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2.3 Experimental Data

2.3.1 Tables

All the references on ESD published through the end of 1983 are classified by the combination of adsorbate and solid, with which each reference is concerned. As a result of it, the compiled data are divided into 64 classes. The references belonging to each class are summarized in Table 1, where the references are shown by registered symbols. The registered symbols consist of the two sets of two figures and the abbreviation of the first author's name. The former set of two figures denotes the year of the publication in the 1900's and the latter set of two figures denotes the series number for an identical abbreviation of the authors. The first column in the table shows the substrates and the first line the adsorbates. The Figure number of the graphs showing the data for each adsorbate/substrate combination is shown in Table 2. In this table, DL indicates the list of miscellaneous data in the last section. Table 3 shows the states of adsorption in cases when available, where D and M in the second column show dissociative adsorption and molecular adsorption, respectively.

TABLE 1 Adsorbate/Substrate Systems in ESD

	H_2	N_2	O_2	CO	CO_2	H_2O	NH_3	NO	F_2,Cl_2	Ar,Xe	Ba	H.C.
Al				68Ga02								
Ti			77Da10									
Ni	68Li08 71Wi01			79Ak01		67K101		80Sa06		75Ba03		
Cu				67Da02								
Nb			77Ag08	73Da01								
Mo	70K105		70K105 66Li05 63Re01 64Re03	67De01 76Do01 77Fe01 78Fe03 66Li04 61Mo02 64Re02		70K105	74Go05		68Re05			
Ru				74Ma11 77Ma21 76Re08								78Ma22
Rh				77Ma21								
Ta			76Ag05									
W	76Fl01 79Ho05 77Ja02 73Je01 73Je03 74Je04 73Ki02 70K104 73Ma10 75Ma12 64Me01	71Ma05 70Ni03 70Ni04	76Ag04 76Ag06 74As01 72As02 68Be01 79Be06 75En01 76Fl01 79Ho04 72Ki01 70K102	72As02 74Ch02 68Co01 73Go02 77Ho01 79Ho06 72Ki02 77Le04 77Le05 64Me01 64Me02	69Ag01 71Ma05 70Ni03 70Ni04	67K101 70K103 70Ni03 70Ni04		71Ma05 67Ya01	76Fl01	81Zh01	76Fl01	

	64Me02 75Me09 75Mel0 70Ni03 70Ni04 77Sa05	76Le03 77Le04 72Lo02 68Ma01 70Ma03 72Ma08 75Mal2 64Me02 75Mel0 70Mu01 70Ni03 70Ni04 78Pr01 78Pr02 77Sa05 74Wa02 67Ya01 67Zi07	64Me03 68Me04 75Me09 75Mel0 72Ne02 71Ne07 70Ni03 70Ni04 83Op01 67Re04 68Sa04 77Sa05 67Ya01 72Ya04 73Ya06			
Re		71Fo01				
Ir		77Ag07	78Sh01			
Pt	70Hu03	81Cr04	81Cr02 73La01		76Co05	75Ba03

Th/W:67Po01　　Cs/W:68Be01　　Hg/W:68Be01　　C_3O_2/Pt:76Re09　　TeO_2/Te:78Mu03

TABLE 1 -CONTINUED

	H_2	O_2	CO	H_2O	NH_3	H_2S	NO	HCl HBr	Na	Cs
Si		74Ki04 72Ni06 75Ni09	78Dy01 74Ki04	75Ni09			75Ni09	75Ni09		
Ge		75Ma15								
BeO			73Go04							
MgO									75Ja01	
Al_2O_3			68Ga01							
GaAs										71Ma04
graphite	69Da04	68Da03 69Da04								
diamond						77Lu01				

TABLE 1 －CONTINUED
Miscellaneous Gas
(including R. G.)

Mo	65Li01
Al-alloy	79Ac01
Ti-alloy	79Ac01
OFHC-Cu	65Fi03 79Ac01
Inconel-alloy	79Ac01
SUS	79Ac01 65Be07 80Bh01 78Dr03 67Mc01 68Va01
CdS	77Dr02 79La02
Glass	67Da03

TABLE 2 Figure Number of the Graphs showing the Data and Data List (DL).

	H_2	N_2	O_2	CO	CO_2	H_2O	NH_3	NO	F_2,Cl_2	Ar,Xe	Ba	H.C.
Al				DL								
Ti			DL									
Ni	DL			DL		Fig.37		DL		DL		
Cu				DL								
Nb			DL	DL								
Mo	DL		Fig. 1 Fig.14 Fig.20 Fig.21 Fig.22 Fig.23 Fig.36	Fig. 2 Fig. 9 Fig.15 Fig.24 Fig.25		Fig.11 Fig.19 Fig.35 Fig.37	DL		DL			
Ru				DL								DL
Rh				DL								
Ta			DL									
W	Fig. 3 Fig.16 Fig.26	DL	Fig. 4 Fig.17 Fig.27 Fig.28 Fig.29 Fig.30 Fig.51 Fig.52 Fig.53 Fig.54	Fig. 5 Fig. 6 Fig. 7 Fig. 8 Fig. 9 Fig.18 Fig.31 Fig.55	DL	Fig.11 Fig.19 Fig.35 Fig.37		DL	DL	DL	DL	
Re			DL									
Ir			DL	DL								

Pt	Fig.10 Fig.32 Fig.33 Fig.34		DL	DL				DL		DL	

Th/W:DL Cs/W:DL Hg/W:DL C_3O_2/Pt:DL TeO_2/Te:DL

TABLE 2 -CONTINUED

	H_2	O_2	CO	H_2O	NH_3	H_2S	NO	HCl HBr	Na	Cs
Si		DL	DL	DL			DL	DL		
Ge		DL								
BeO			DL							
MgO									DL	
Al_2O_3			DL							
GaAs										DL
graphite	DL	DL								
diamond						DL				

TABLE 2 －CONTINUED

Mo	DL
Al-alloy	Fig.41
Ti-alloy	Fig.42 Fig.47 Fig.48 Fig.49 Fig.50
OFHC-Cu	Fig.38 Fig.43 Fig.47 Fig.48 Fig.49 Fig.50
Inconel-alloy	Fig.44 Fig.45 Fig.47 Fig.48 Fig.49 Fig.50
SUS	Fig.12 Fig.13 Fig.39 Fig.40 Fig.46 Fig.47 Fig.48 Fig.49 Fig.50
CdS	DL
Glass	DL

TABLE 3

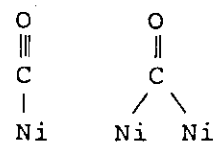
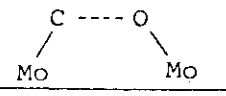
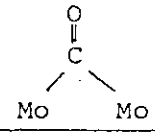
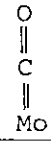
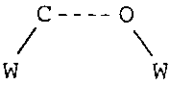
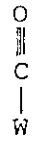
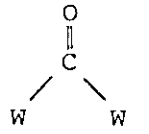
gas/ solid	adsorbed states	desorbed species	configurations	remarks	ref.
CO/Ni	Beta M	O^+		linear and bridge form	79Ak01
CO/Cu	? M	O^+			67Da02
CO/Nb	? M	CO^+			73Da01
CO/Mo	Beta 3 D Beta 2 ?	O^+			64Re02 66Li04 78Fe03
	Beta 1 M	CO^+ O^+			
	Alpha M	CO O^+		no substate	
	Virgin M	CO^+			
	Phys. ad. M	CO CO^+			
CO/Ru	Beta M	O^+			77Ma11
	Alpha M	CO^+			
CO/Rh	? M	CO^+			77Ma21
CO/W	Beta D	O^+		lying down form	72Ki02 72Ya04 79Ho06
	Alpha M	CO CO^* CO^+ O^+ O^-		linear form [carbonyl structure]	
	Virgin M	CO^+		bridge form	

TABLE 3 -CONTINUED

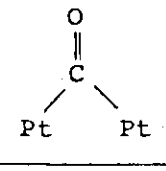
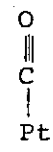
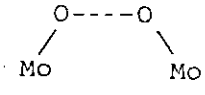
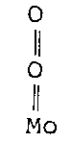
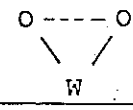
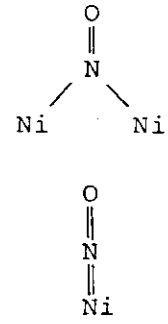
CO/Pt	Beta M	CO CO^+ O^+		brige structure	73La01
	Alpha M			linear form	
H_2/Ni	Beta 2 D	?			68Li08
	Beta 1 M	H^+		Beta 2-p.	
H_2/W	Beta 2 D	H^+ H^-			73Ma10 73Je01 79Ho05
	Beta 1 M	H^+		two-fold bridge site	
	Gamma M	H_2 H^+			
	Kappa M	H^+		coadsorbed state with CO,O.	
H_2/Pt	? M	H^+			70Hu03
N_2/W	Beta D	?			70Ni03 71Ma05
	Alpha M	N^+			
	Kappa M	N^+			
O_2/Mo	Beta D	O^+			66Li05
	Alpha M	O^+ O^-			

TABLE 3 -CONTINUED

O_2/W	Beta 2 D	O^+		O atom above the second layer for W(100)	72Ma08 76Le03
	Beta 1 M	O^+ O^-			79Ho04
	Beta-p. M	O_2 O^+		adsorption temp. 40K	
O_2/Pt	Beta D	?			81Cr04
	Alpha M	O^+		adsorption temp. 110k	
CO_2/W	? D	O^+		lying down form	71Ma05
NO/Ni	? M	O^+ NO^+			
NO/Pt	Beta M	O^+ NO^+		dissociation occures under electron impact	76Co05

2.3.2 Graphs and Data Lists for Total Desorption Cross Section

The total desorption cross sections for various adsorbate/substrate combinations are shown in Figs. 1-13 as a function of incident electron energy. It can be seen that the cross sections show a strong dependence on the adsorption state. In general, the cross sections are higher for weakly bound adsorbates (molecular adsorption) than for strongly bound adsorbates (dissociative adsorption) although there is some scatter in data. For example, the cross section for α-CO on molybdenum, a linearly bound structure, is appreciably greater than that for the more strongly adsorbed β-CO on molybdenum, where the CO is bound in a "lying down" form or is dissociatively adsorbed. [see Table 3] A main feature revealed from these figures is that the cross section increases to a maximum just beyond the threshold energy and that it either remains relatively constant or falls off very slowly at electron energies greater than 100 eV. Figs. 12 and 13 show a different feature that the cross section falls off sharply with increasing electron energies. Data list are attached to all the figures.

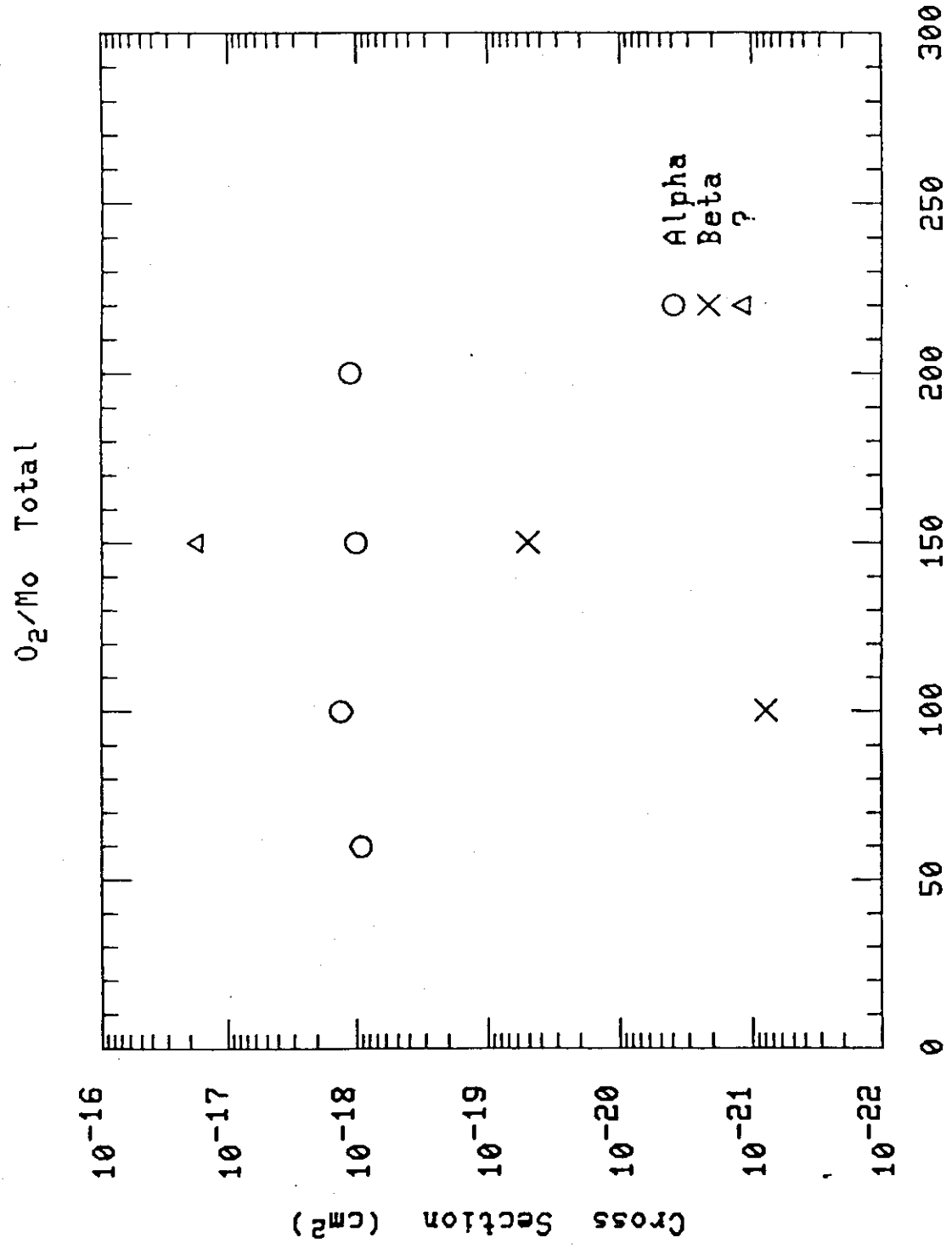


Fig. 1 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
poly	Alpha	0.600E+02	300	O+	0.920E-18	64Re03	
poly	Alpha	0.100E+03	300	O+	0.130E-17	64Re03	
poly	Alpha	0.150E+03	420	O	0.100E-17	70K105	
poly	Alpha	0.200E+03	300	O+	0.110E-17	64Re03	
poly	Beta	0.100E+03	?	?	0.780E-21	64Re03	
poly	Beta	0.150E+03	?	?	0.500E-19	70K105	
poly	?	0.150E+03	420	O2	0.175E-16	70K105	*1)

*1) very loosely bound state

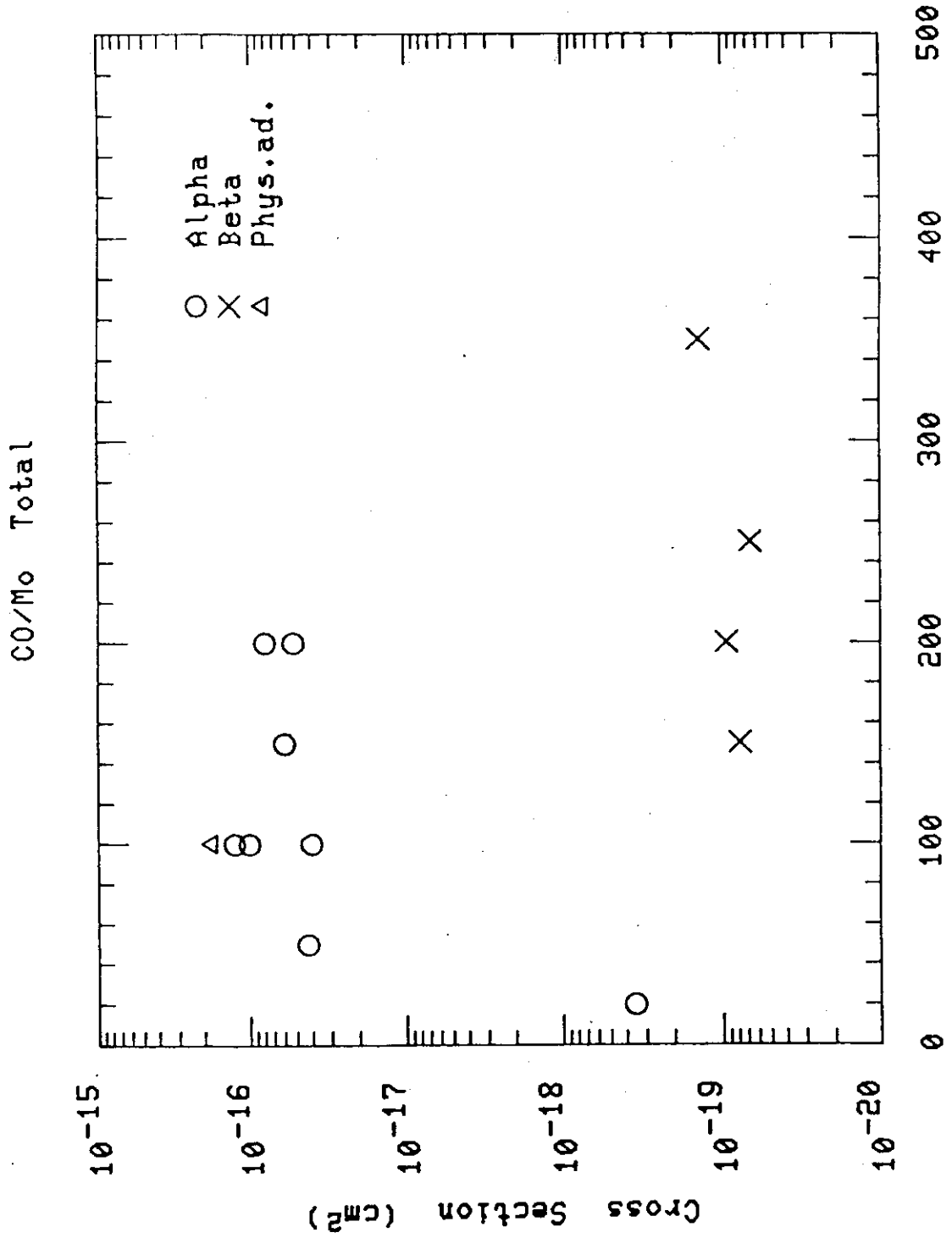


Fig. 2 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
tip	Alpha	0.200E+02	20	?	0.350E-18	64Me02	*1)
poly	Alpha	0.500E+02	300	ion	0.423E-16	76Do01	*2)
poly	Alpha	0.100E+03	300	ion	0.125E-15	76Do01	*2)
poly	Alpha	0.100E+03	300	O+	0.400E-16	67De01	
poly	Alpha	0.100E+03	300	O+	0.100E-15	64Re02	*3)
poly	Alpha	0.150E+03	300	ion	0.595E-16	76Do01	*2)
poly	Alpha	0.200E+03	300	ion	0.525E-16	76Do01	*2)
poly	Alpha	0.200E+03	300	CO	0.800E-16	64Re02	*3)
poly	Beta	0.150E+03	300	ion	0.775E-19	76Do01	*4)
poly	Beta	0.200E+03	300	ion	0.940E-19	76Do01	*4)
poly	Beta	0.250E+03	300	ion	0.670E-19	76Do01	*4)
poly	Beta	0.350E+03	300	ion	0.140E-18	76Do01	*4)
poly	Phys.ad.	0.100E+03	300	CO+	0.180E-15	67De01	

*1) work function
*2) spherical ion collector
*3) full coverage
*4) carbon containing species co+

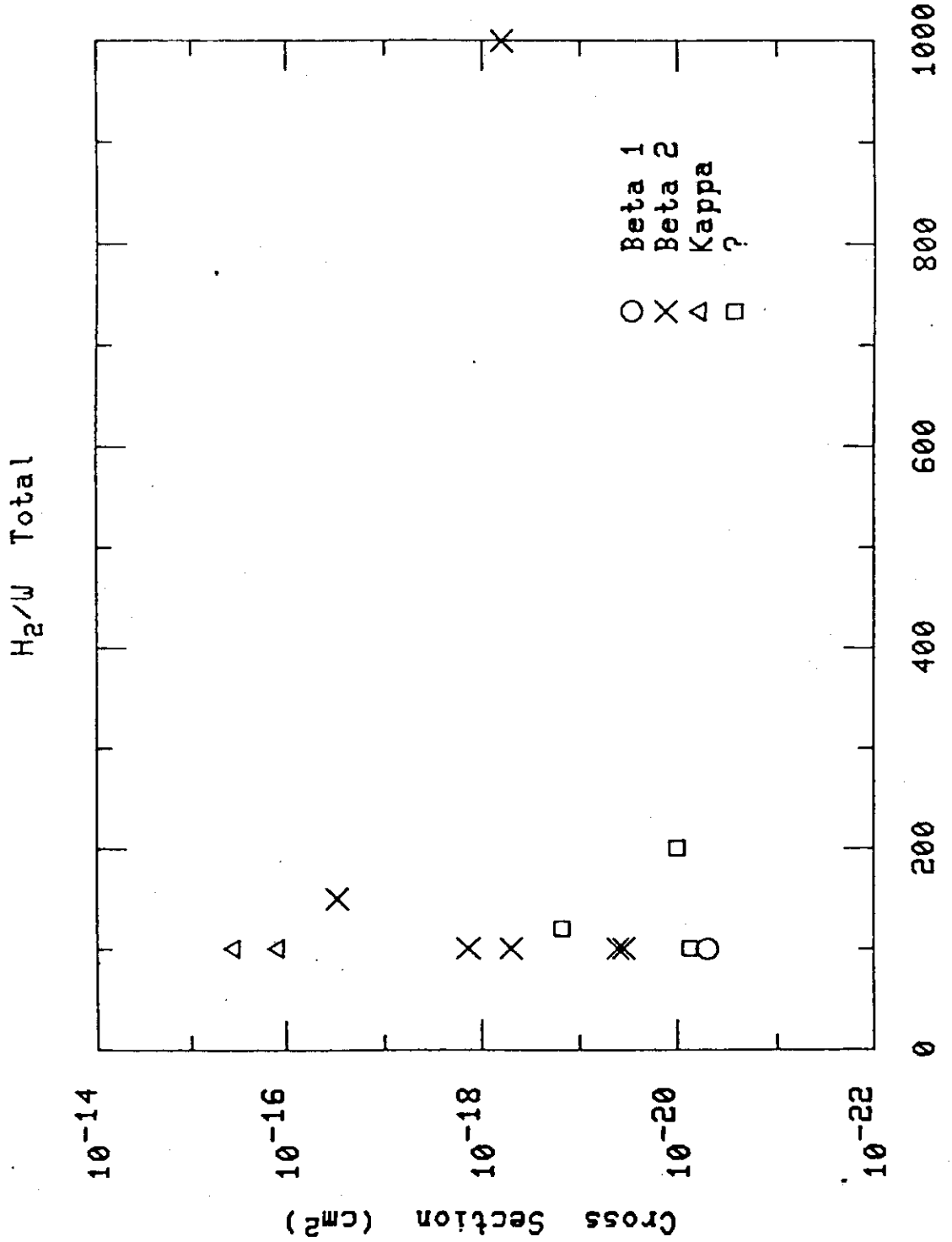


Fig. 3 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
tip	Beta 1	0.100E+03	20	?	0.500E-20	64Me02	*1)
poly	Beta 1	0.100E+03	?	?	0.500E-20	75Me10	*1)
110	Beta 2	0.100E+03	280	H+	0.140E-17	73Ki02	
tip	Beta 2	0.100E+03	20	?	0.350E-19	64Me02	*1)
poly	Beta 2	0.100E+03	?	?	0.400E-19	75Me10	*1)
poly	Beta 2	0.100E+03	300	H+	0.500E-18	75Me10	
poly	Beta 2	0.150E+03	430	H2	0.300E-16	70Kl04	*2)
poly	Beta 2	0.100E+04	300	H-	0.630E-18	79Ho05	
100	Kappa	0.100E+03	?	H2	0.120E-15	73Je01	
100	Kappa	0.100E+03	300	newtral	0.120E-15	74Je04	*3)
100	Kappa	0.100E+03	300	newtral	0.350E-15	74Je04	*4)
tip	?	0.100E+03	20-150	?	0.730E-20	64Me02	*1)
100	?	0.120E+03	?	?	0.150E-18	77Ja02	
tip	?	0.200E+03	?	?	0.100E-19	64Me01	*1)

*1) work function
*2) 2.4E+14 molecules/cm**2
*3) coadsorption with CO
*4) coadsorption with O2

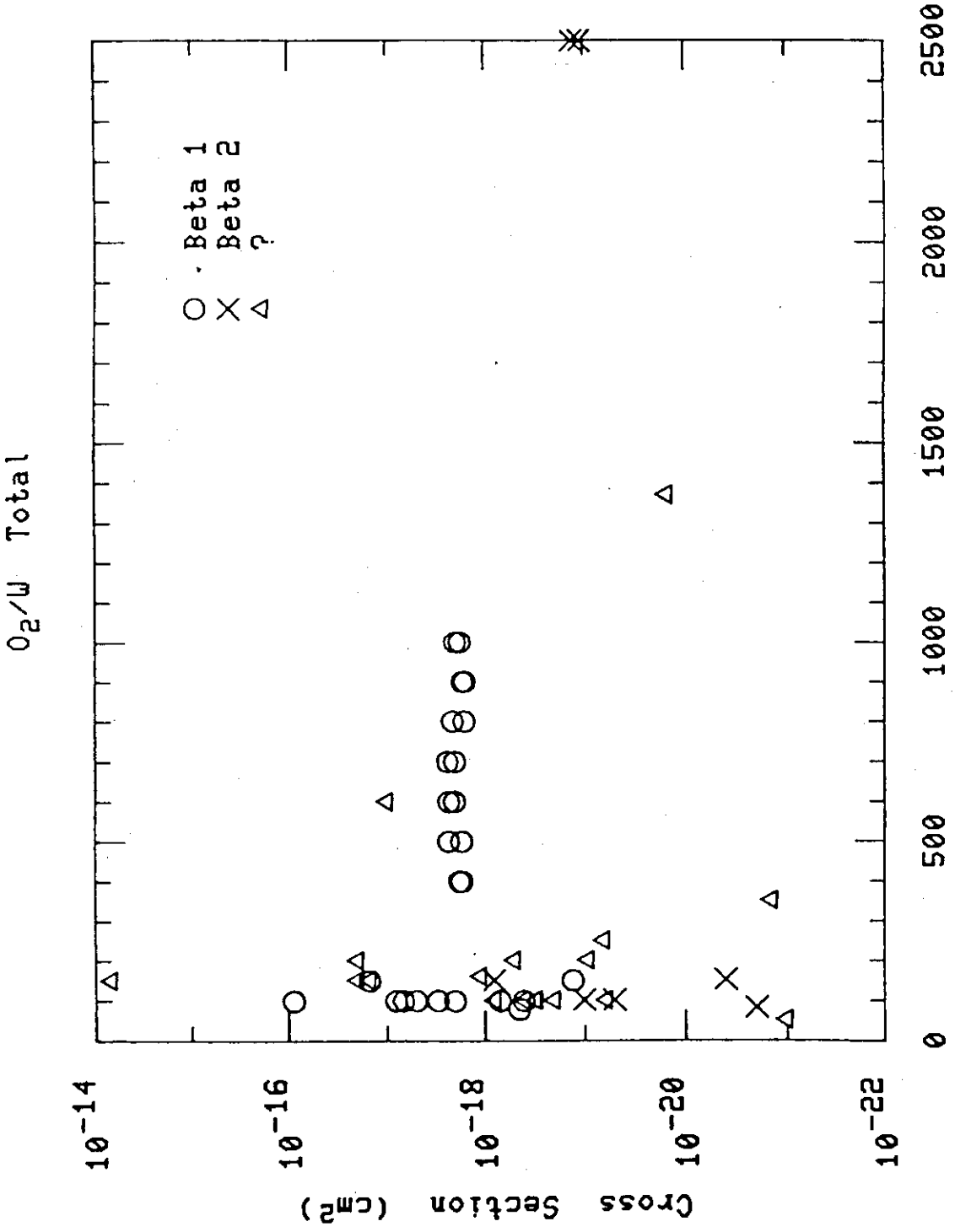


Fig. 4 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
tip	Beta 1	0.800E+02	20	?	0.450E-18	64Me02	*1)
100	Beta 1	0.100E+03	300	O+	0.200E-17	76Ag04	
poly	Beta 1	0.100E+03	300	O+	0.880E-16	72Lo02	
poly	Beta 1	0.100E+03	300	O+	0.700E-18	68Ma01	
poly	Beta 1	0.100E+03	300	O+	0.800E-17	70Ma03	
110	Beta 1	0.100E+03	300	O+	0.300E-17	70Ma03	
110	Beta 1	0.100E+03	300	O+	0.700E-18	72Ma08	
100	Beta 1	0.100E+03	300	O+	0.200E-17	72Ma08	
poly	Beta 1	0.100E+03	300	O+	0.300E-17	70Ni03	*2)
poly	Beta 1	0.100E+03	300	?	0.500E-17	72Ki01	
poly	Beta 1	0.100E+03	300	neutral	0.680E-17	72Ki01	*3)
100	Beta 1	0.100E+03	300	O+	0.400E-18	72Ma08	
100	Beta 1	0.150E+03	300	O+	0.130E-18	79Be06	*4)
poly	Beta 1	0.150E+03	430	O2/O+	0.150E-16	70Kl02	neutral
poly	Beta 1	0.400E+03	300	O	0.170E-17	79Ho04	
poly	Beta 1	0.400E+03	300	O	0.180E-17	79Ho04	
poly	Beta 1	0.500E+03	300	?	0.230E-17	79Ho04	
poly	Beta 1	0.500E+03	300	?	0.170E-17	79Ho04	
poly	Beta 1	0.600E+03	300	?	0.230E-17	79Ho04	
poly	Beta 1	0.600E+03	300	?	0.200E-17	79Ho04	
poly	Beta 1	0.700E+03	300	?	0.240E-17	79Ho04	
poly	Beta 1	0.700E+03	300	?	0.200E-17	79Ho04	
poly	Beta 1	0.800E+03	300	?	0.210E-17	79Ho04	
poly	Beta 1	0.800E+03	300	?	0.160E-17	79Ho04	
poly	Beta 1	0.900E+03	300	?	0.170E-17	79Ho04	
poly	Beta 1	0.900E+03	300	?	0.160E-17	79Ho04	
poly	Beta 1	0.100E+04	300	?	0.200E-17	79Ho04	
poly	Beta 1	0.100E+04	300	?	0.180E-17	79Ho04	
tip	Beta 2	0.800E+02	20-600	?	0.200E-20	64Me02	
100	Beta 2	0.100E+03	300	O+	0.100E-18	76Ag04	
100	Beta 2	0.100E+03	300	O+	0.500E-19	72Ma08	
100	Beta 2	0.150E+03	300	O+	0.400E-20	79Be06	*4)
poly	Beta 2	0.150E+03	430	O/O+	0.800E-18	70Kl02	*5)
100	Beta 2	0.250E+04	300	?	0.130E-18	74Wa02	*6)
100	Beta 2	0.250E+04	77	?	0.110E-18	74Wa02	*6)
poly	?	0.500E+02	300	?	0.100E-20	68Be01	*7)
poly	?	0.100E+03	300	?	0.310E-18	68Be01	*7)
poly	?	0.100E+03	300	?	0.400E-18	67Ya01	*8)
poly	?	0.100E+03	300	?	0.790E-18	67Ya01	*8)
poly	?	0.100E+03	77	?	0.300E-18	68Be01	
ribbon	?	0.100E+03	300	O+ ?	0.600E-19	76Fl01	state 1
ribbon	?	0.100E+03	300	O+	0.200E-18	76Fl01	state 2
110	?	0.150E+03	<25	O+	0.700E-14	76Le03	
110	?	0.150E+03	27~40	O+	0.200E-16	76Le03	
110	?	0.150E+03	>45	O+	0.200E-16	76Le03	

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110	?	0.150E+03	100	O+	0.150E-16	77Le04	LEED gun
110	?	0.160E+03	?	O+	0.110E-17	75En01	
110	?	0.200E+03	300	O+	0.200E-16	74As01	0.3L
110	?	0.200E+03	300	O+	0.500E-18	74As01	2000L
poly	?	0.200E+03	300	?	0.910E-19	68Be01	
poly	?	0.250E+03	?	?	0.634E-19	68Be01	
100	?	0.350E+03	300	?	0.140E-20	79Be06	*4)
110/111	?	0.600E+03	?	?	0.100E-16	67Zi07	*1)
110	?	0.137E+04	?	?	0.150E-19	70Mu01	AES

*1) work function
*2) QMS 38
*3) 7.6E+13 molecules/cm**2
*4) incident angle ~40
QMS ~ 5
*5) 3.0E+14 molecules/cm**2
*6) incident angle ~90
(AES)
*7) work function,ref.64Me02
*8) incident angle ~90

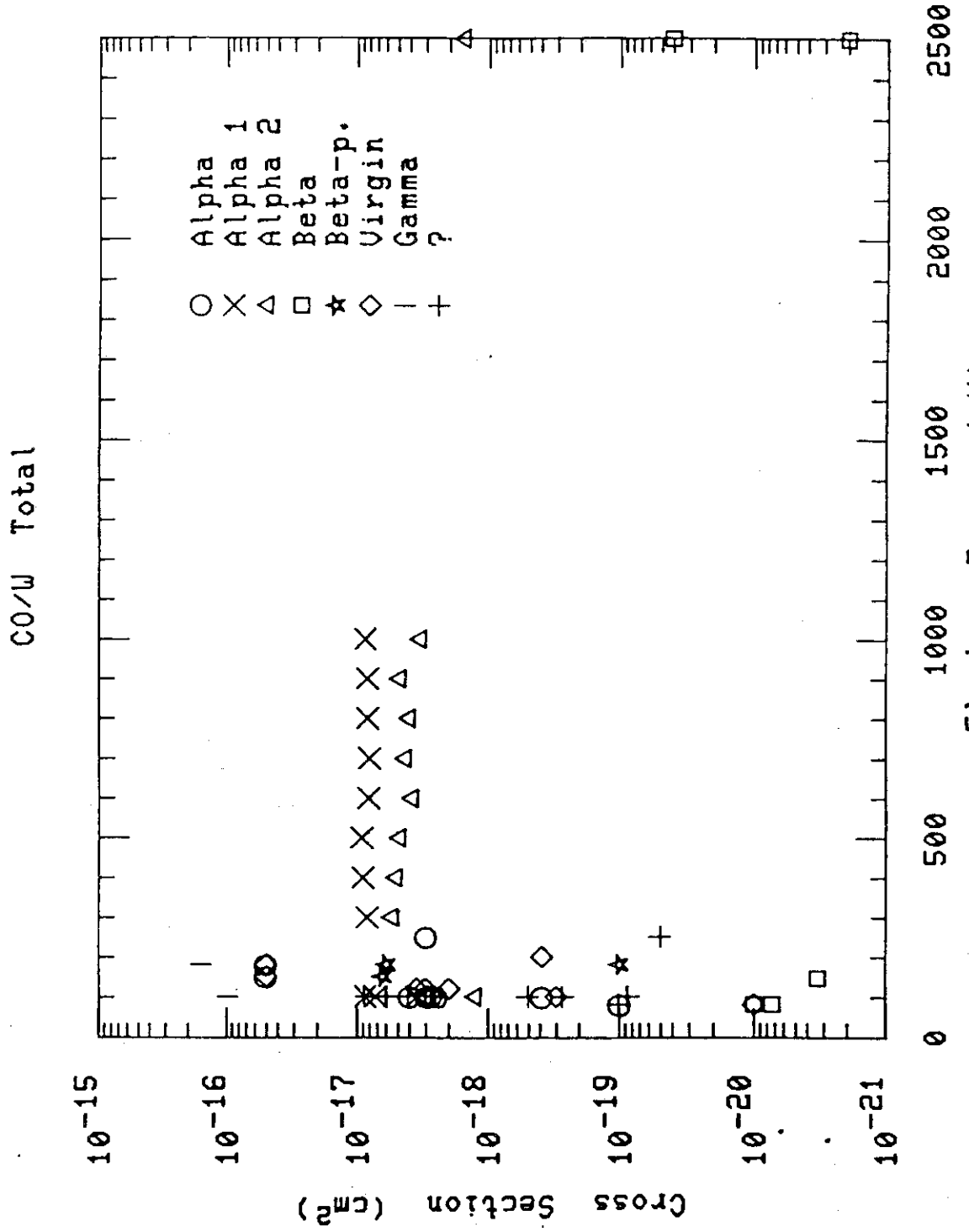

Fig. 5 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
tip	Alpha	0.800E+02	20	?	0.100E-18	64Me01	*1)
poly	Alpha	0.100E+03	300	?	0.390E-18	67Ya01	*2)
100	Alpha	0.100E+03	295	?	0.400E-17	72Ya04	*3)
poly	Alpha	0.100E+03	300	CO+/O+	0.250E-17	70Ni03	*4)
poly	Alpha	0.100E+03	300	O+	0.300E-17	67Re04	*4)
Ribbon	Alpha	0.100E+03	?	O+	0.280E-17	68Sa03	*5)
110	Alpha	0.150E+03	20	?	0.500E-16	77Le04	*6)
110	Alpha	0.180E+03	20	CO+	0.500E-16	77Le05	*7)
tip	Alpha	0.250E+03	20	?	0.300E-17	64Me03	*8)
poly	Alpha 1	0.100E+03	300	?	0.350E-17	68Me04	
100	Alpha 1	0.100E+03	295	?	0.880E-17	72Ya06	
?	Alpha 1	0.100E+03	300	?	0.725E-17	68Me04	
poly	Alpha 1	0.300E+03	300	CO+	0.840E-17	79Ho06	
poly	Alpha 1	0.400E+03	300	CO+	0.900E-17	79Ho06	
poly	Alpha 1	0.500E+03	300	CO+	0.920E-17	79Ho06	
poly	Alpha 1	0.600E+03	300	CO+	0.820E-17	79Ho06	
poly	Alpha 1	0.700E+03	300	CO+	0.810E-17	79Ho06	
poly	Alpha 1	0.800E+03	300	CO+	0.840E-17	79Ho06	
poly	Alpha 1	0.900E+03	300	CO+	0.840E-17	79Ho06	
poly	Alpha 1	0.100E+04	300	CO+	0.880E-17	79Ho06	
poly	Alpha 2	0.100E+03	300	?	0.125E-17	68Me04	
?	Alpha 2	0.100E+03	?	O+	0.300E-17	76F101	*5)
poly	Alpha 2	0.300E+03	300	O+	0.540E-17	79Ho06	
poly	Alpha 2	0.400E+03	300	O+	0.500E-17	79Ho06	
poly	Alpha 2	0.500E+03	300	O+	0.470E-17	79Ho06	
poly	Alpha 2	0.600E+03	300	CO+	0.380E-17	79Ho06	
poly	Alpha 2	0.700E+03	300	CO+	0.430E-17	79Ho06	
poly	Alpha 2	0.800E+03	300	CO+	0.400E-17	79Ho06	
poly	Alpha 2	0.900E+03	300	CO+	0.470E-17	79Ho06	
poly	Alpha 2	0.100E+04	300	CO+	0.330E-17	79Ho06	
100	Alpha 2	0.250E+04	300	CO+	0.155E-17	77Ho01	*9)
tip	Beta	0.800E+02	20	?	0.100E-19	64Me01	*1)
tip	Beta	0.800E+02	20/200	?	0.730E-20	64ME01	*1)
100	Beta	0.145E+03	20	?	0.330E-20	64Me03	*1)
100	Beta	0.250E+04	300	?	0.200E-20	77Ho01	*9)
100	Beta	0.250E+04	300	?	0.400E-19	74Ch02	*9)
110	Beta-p.	0.150E+03	20	?	0.640E-17	77Le04	*6)
110	Beta-p.	0.180E+03	20	O+	0.600E-17	77Le05	
110	Beta-p.	0.180E+03	20	O+	0.100E-18	77Le05	
tip	Virgin	0.800E+02	20	?	0.100E-19	64Me01	
poly	Virgin	0.100E+03	?	CO+	0.300E-18	67Re04	
110	Virgin	0.120E+03	90	CO+	0.350E-17	83Op01	

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110	Virgin	0.120E+03	90	CO	0.300E-17	83Op01	
110	Virgin	0.120E+03	90	O+	0.200E-17	83Op01	
110	Virgin	0.150E+03	20	?	0.500E-16	77Le04	
110	Virgin	0.180E+03	20~250	CO+	0.500E-16	77Le05	
tip	Virgin	0.200E+03	20	?	0.385E-18	64Me03	*8)
110	Gamma	0.100E+03	?	?	0.100E-15	75Me10	
110	Gamma	0.180E+03	20	CO+	0.160E-15	77Le05	
tip	?	0.800E+02	20	?	0.100E-18	64Me04	*10)
poly	?	0.100E+03	?	?	0.500E-18	67Ya01	*11)
100	?	0.100E+03	?	CO	0.600E-17	75Me10	*12)
?	?	0.100E+03	?	CO+	0.270E-18	76Fl01	*5)
?	?	0.100E+03	?	?	0.260E-17	76Fl01	*5)
?	?	0.100E+03	?	?	0.860E-19	76Fl01	*5)
100	?	0.100E+03	?	CO+/O+	0.410E-17	73Ya06	*13)
100	?	0.100E+03	?	CO+/O+	0.880E-17	73Ya06	*14)
poly	?	0.250E+03	?	?	0.500E-19	66Su02	

*1) work function
*2) incident angle ~90
*3) adsorption temp. ~100K
*4) cylindrical magnetic SP.
*5) QMS
*6) LEED gun
*7) QMS on axis
*8) from Fig.34
*9) AES
*10) virgin --> Beta
*11) Alpha+Beta 1
*12) Alpha 1 or virgin
*13) Alpha 1,Alpha 2,virgin ad.temp 100k
*14) Alpha 1,Alpha 2,virgin ad.temp 200-300k

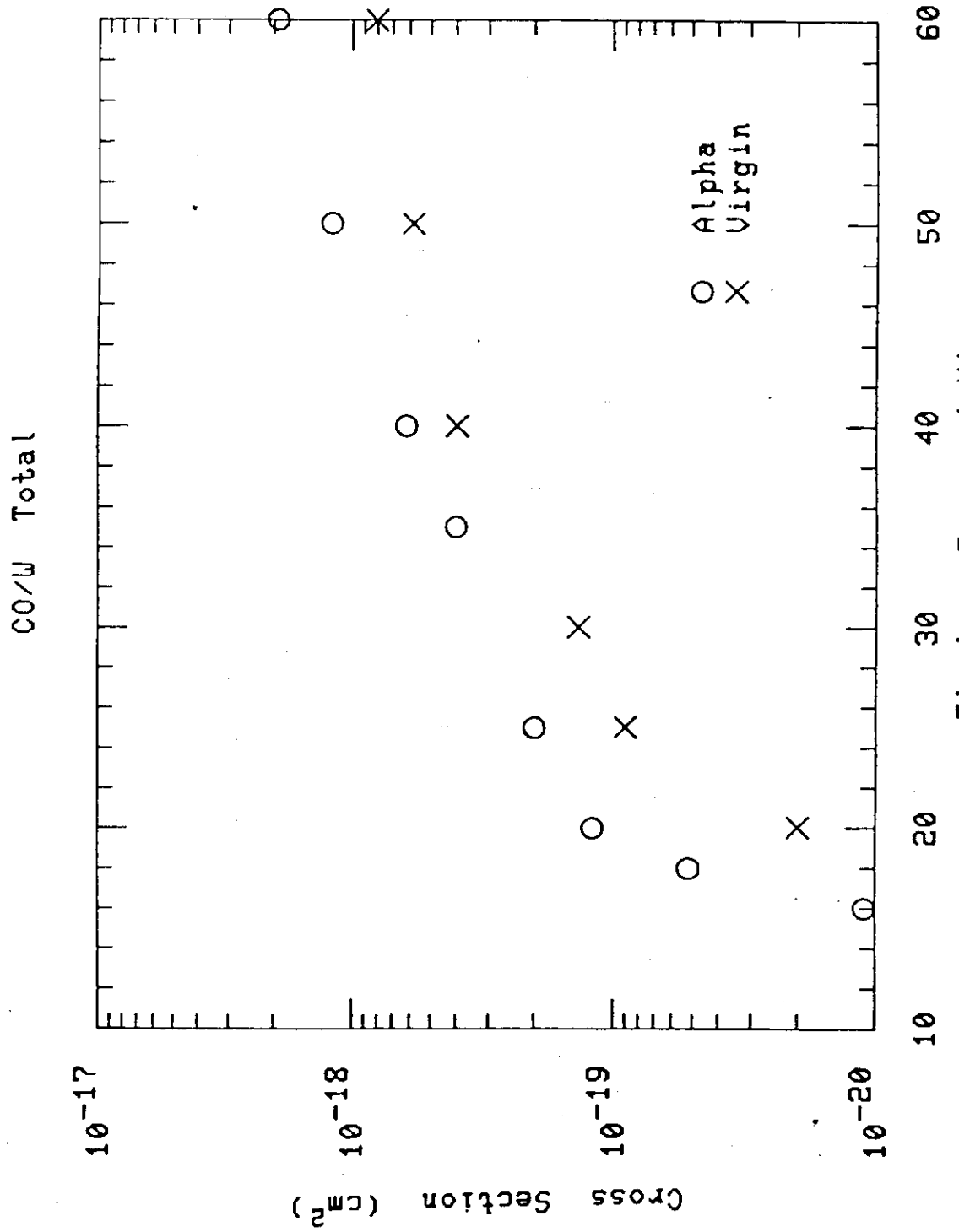

Fig. 6 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
tip	Alpha	0.160E+02	20	?	0.111E-19	64Me03	*1)
tip	Alpha	0.180E+02	20	?	0.517E-19	64Me03	*1)
tip	Alpha	0.200E+02	20	?	0.119E-18	64Me03	*1)
tip	Alpha	0.250E+02	20	?	0.199E-18	64Me03	*1)
tip	Alpha	0.350E+02	20	?	0.399E-18	64Me03	*1)
tip	Alpha	0.400E+02	20	?	0.614E-18	64Me03	*1)
tip	Alpha	0.500E+02	20	?	0.120E-17	64Me03	*1)
tip	Alpha	0.600E+02	20	?	0.192E-17	64Me03	*1)
tip	Virgin	0.200E+02	20	?	0.199E-19	64Me03	*1)
tip	Virgin	0.250E+02	20	?	0.897E-19	64Me03	*1)
tip	Virgin	0.300E+02	20	?	0.135E-18	64Me03	*1)
tip	Virgin	0.400E+02	20	?	0.394E-18	64Me03	*1)
tip	Virgin	0.500E+02	20	?	0.589E-18	64Me03	*1)
tip	Virgin	0.600E+02	20	?	0.805E-18	64Me03	*1)

*1) work function

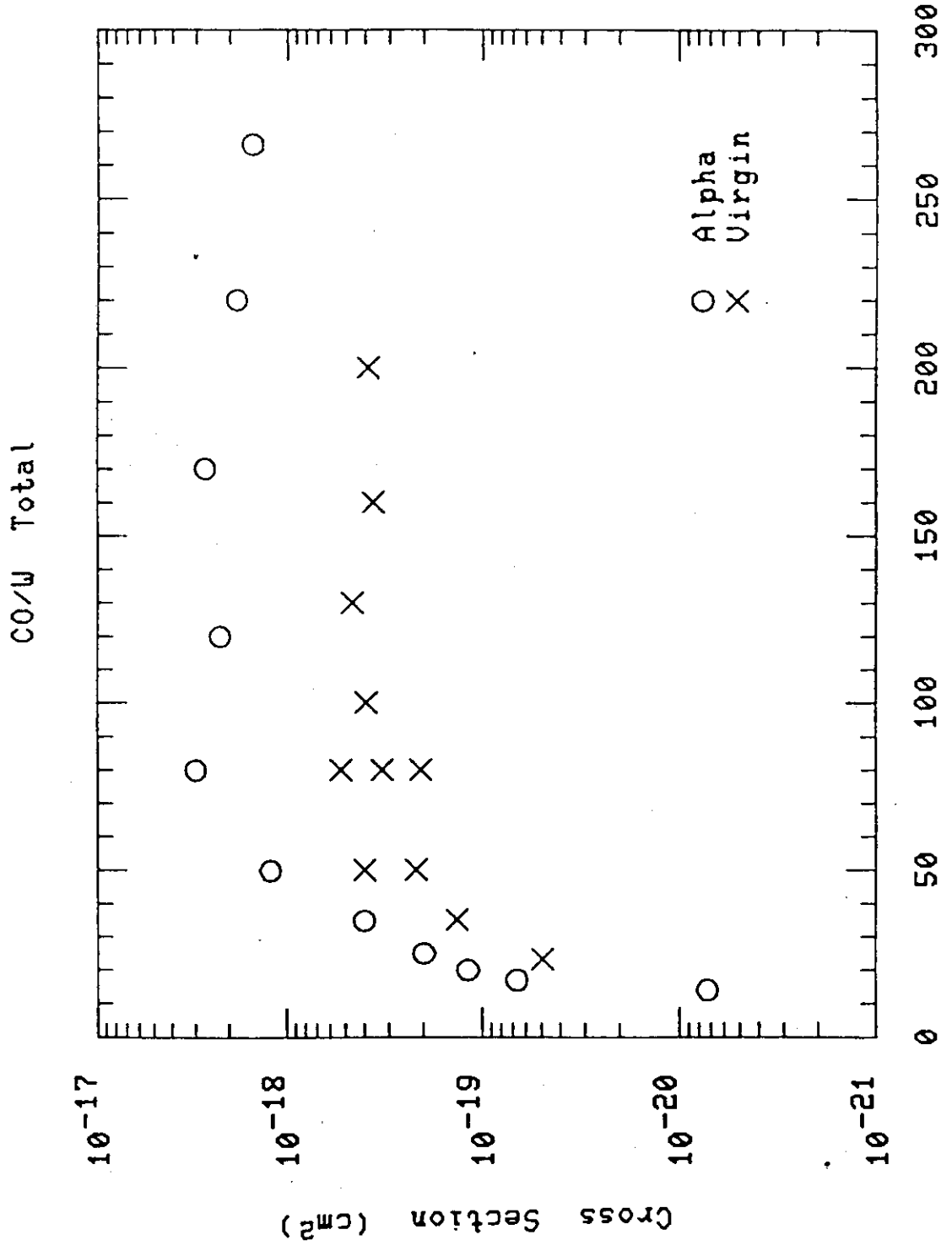

Fig. 7 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
tip	Alpha	0.140E+02	20	?	0.729E-20	64Me03	*1)
tip	Alpha	0.170E+02	20	?	0.668E-19	64Me03	*1)
tip	Alpha	0.200E+02	20	?	0.119E-18	64Me03	*1)
tip	Alpha	0.250E+02	20	?	0.199E-18	64Me03	*1)
tip	Alpha	0.350E+02	20	?	0.400E-18	64Me03	*1)
tip	Alpha	0.500E+02	20	?	0.121E-17	64Me03	*1)
tip	Alpha	0.800E+02	20	?	0.301E-17	64Me03	*1)
tip	Alpha	0.120E+03	20	?	0.224E-17	64Me03	*1)
tip	Alpha	0.170E+03	20	?	0.268E-17	64Me03	*1)
tip	Alpha	0.220E+03	20	?	0.183E-17	64Me03	*1)
tip	Alpha	0.266E+03	20	?	0.152E-17	64Me03	*1)
tip	Virgin	0.230E+02	20	?	0.494E-19	64Me03	*1)
tip	Virgin	0.350E+02	20	?	0.135E-18	64Me03	*1)
tip	Virgin	0.500E+02	20	?	0.218E-18	64Me03	*1)
tip	Virgin	0.500E+02	20	?	0.399E-18	64Me03	*1)
tip	Virgin	0.800E+02	20	?	0.207E-18	64Me03	*1)
tip	Virgin	0.800E+02	20	?	0.327E-18	64Me03	*1)
tip	Virgin	0.800E+02	20	?	0.529E-18	64Me03	*1)
tip	Virgin	0.100E+03	20	?	0.393E-18	64Me03	*1)
tip	Virgin	0.130E+03	20	?	0.464E-18	64Me03	*1)
tip	Virgin	0.160E+03	20	?	0.363E-18	64Me03	*1)
tip	Virgin	0.200E+03	20	?	0.385E-18	64Me03	*1)

*1) work function

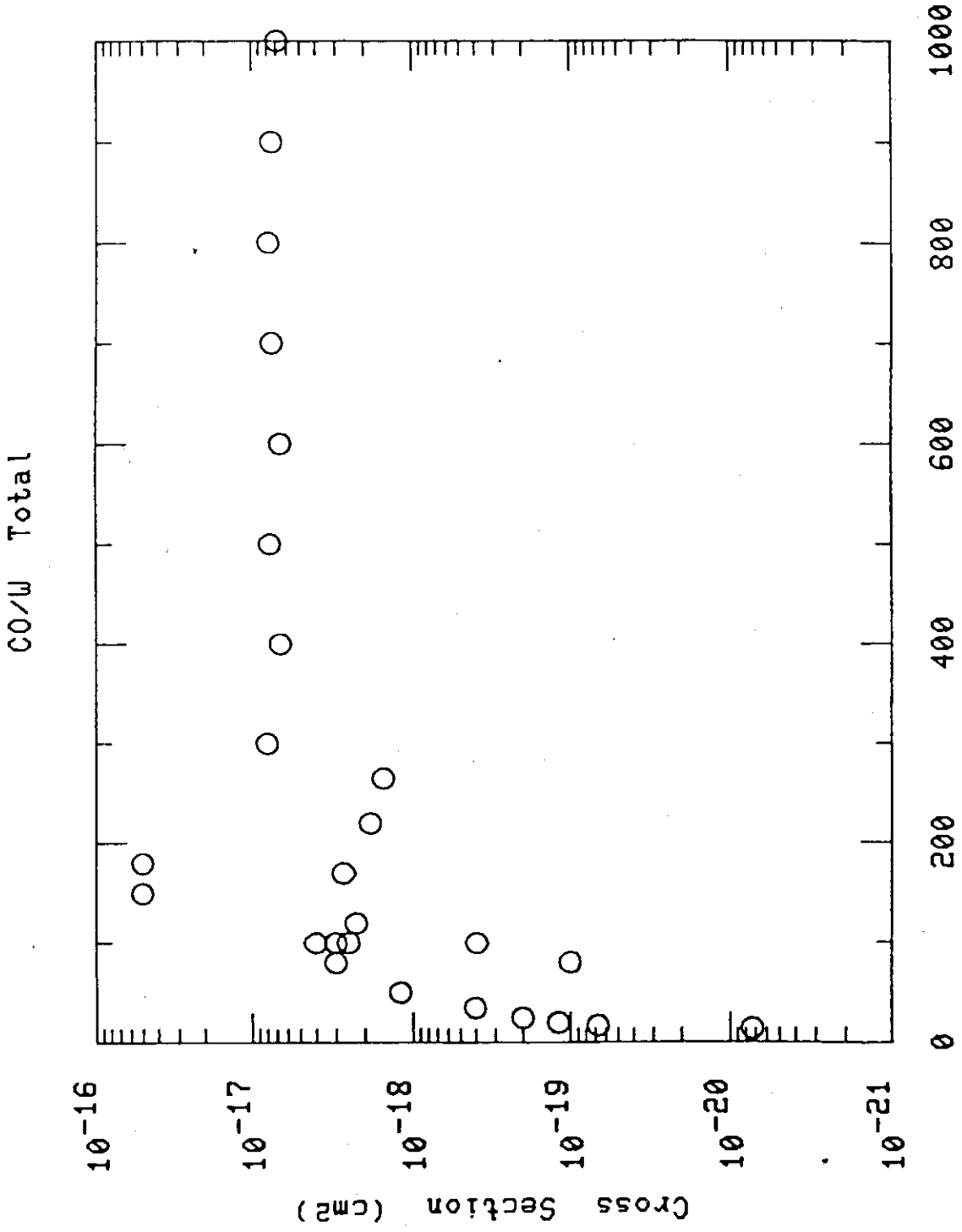

Fig. 8 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
tip	Alpha	0.139E+02	20	?	0.730E-20	64Me03	*1)
tip	Alpha	0.170E+02	20	?	0.670E-19	64Me03	*1)
tip	Alpha	0.200E+02	20	?	0.119E-18	64Me03	*1)
tip	Alpha	0.250E+02	20	?	0.200E-18	64Me03	*1)
tip	Alpha	0.350E+02	20	?	0.400E-18	64Me03	*1)
tip	Alpha	0.500E+02	20	?	0.120E-17	64Me03	*1)
tip	Alpha	0.800E+02	20	?	0.300E-17	64Me03	*1)
tip	Alpha	0.800E+02	20	?	0.100E-18	64Me01	*1)
poly	Alpha	0.100E+03	300	CO+/O+	0.250E-17	70Ni03	
poly	Alpha	0.100E+03	300	?	0.390E-18	67Ya01	
100	Alpha	0.100E+03	295	?	0.400E-17	72Ya04	
poly	Alpha	0.100E+03	300	O+	0.300E-17	67Re04	
tip	Alpha	0.120E+03	20	?	0.224E-17	64Me03	
110	Alpha	0.150E+03	20	?	0.500E-16	77Le04	*2)
tip	Alpha	0.170E+03	20	?	0.268E-17	64Me03	
110	Alpha	0.180E+03	20	CO+	0.500E-16	77Le05	
tip	Alpha	0.220E+03	20	?	0.183E-17	64Me03	
tip	Alpha	0.265E+03	20	?	0.152E-17	64Me03	
poly	Alpha	0.300E+03	300	O-	0.800E-17	79Ho06	
poly	Alpha	0.400E+03	300	O-	0.660E-17	79Ho06	
poly	Alpha	0.500E+03	300	O-	0.770E-17	79Ho06	
poly	Alpha	0.600E+03	300	O-	0.660E-17	79Ho06	
poly	Alpha	0.700E+03	300	O-	0.750E-17	79Ho06	
poly	Alpha	0.800E+03	300	O-	0.790E-17	79Ho06	
poly	Alpha	0.900E+03	300	O-	0.750E-17	79Ho06	
poly	Alpha	0.100E+04	300	O-	0.690E-17	79Ho06	

*1) work function
*2) LEED gun

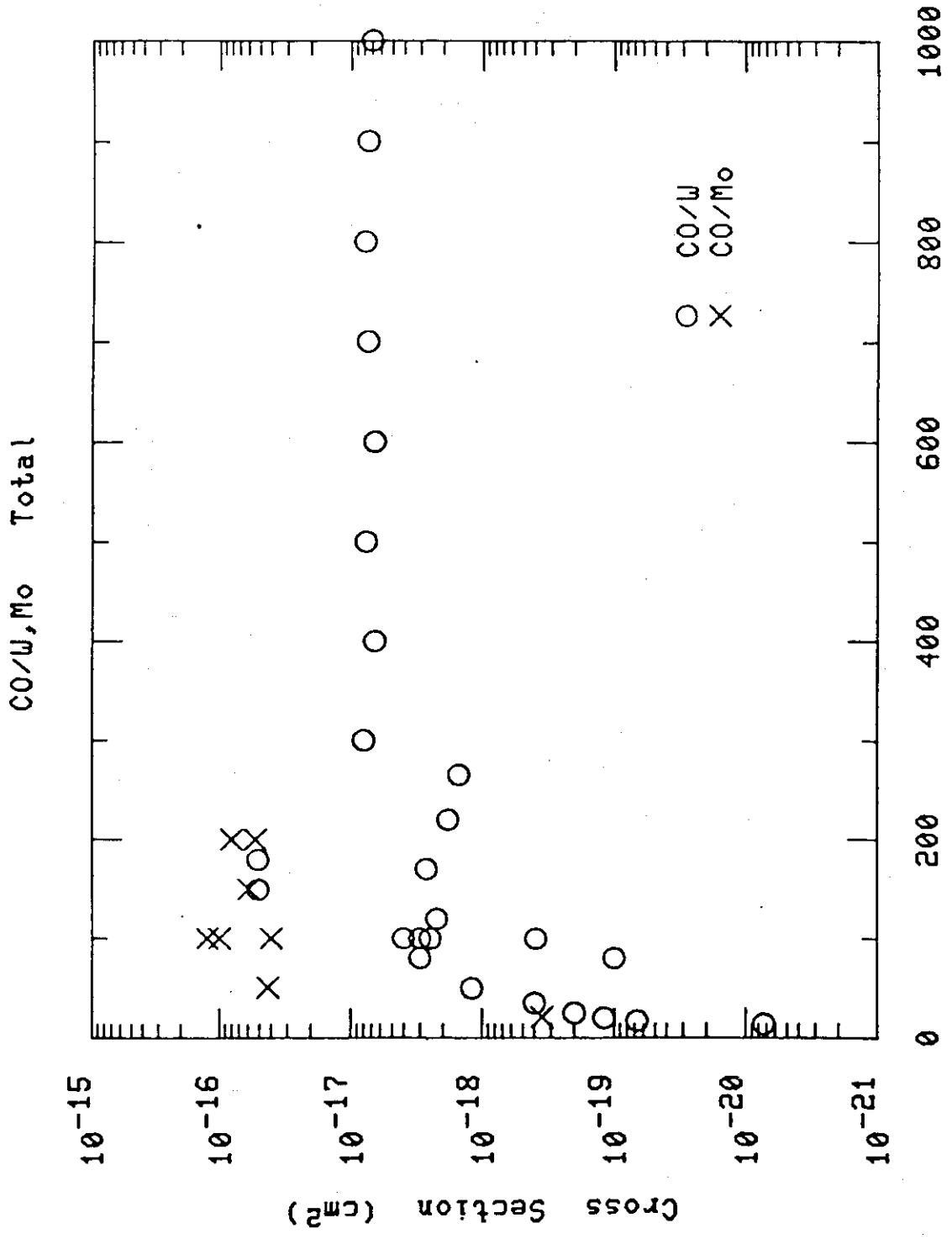

Fig. 9 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
W tip	Alpha	0.139E+02	20	?	0.730E-20	64Me03	*1)
W tip	Alpha	0.170E+02	20	?	0.670E-19	64Me03	*1)
W tip	Alpha	0.200E+02	20	?	0.119E-18	64Me03	*1)
W tip	Alpha	0.250E+02	20	?	0.200E-18	64Me03	*1)
W tip	Alpha	0.350E+02	20	?	0.400E-18	64Me03	*1)
W tip	Alpha	0.500E+02	20	?	0.120E-17	64Me03	*1)
W tip	Alpha	0.800E+02	20	?	0.300E-17	64Me03	*1)
W tip	Alpha	0.800E+02	20	?	0.100E-18	64Me01	*1)
W poly	Alpha	0.100E+03	300	O+	0.300E-17	67Re04	
W tip	Alpha	0.100E+03	300	?	0.390E-18	67Ya01	*2)
W(100)	Alpha	0.100E+03	295	?	0.400E-17	72Ya04	*3)
W tip	Alpha	0.100E+03	300	CO+/O+	0.250E-17	70Ni03	
W tip	Alpha	0.120E+03	20	?	0.224E-17	64Me03	*1)
W(110)	Alpha	0.150E+03	20	?	0.500E-16	77Le04	*4)
W tip	Alpha	0.170E+03	20	?	0.268E-17	64Me03	*1)
W(110)	Alpha	0.180E+03	20	CO+	0.500E-16	77Le05	
W tip	Alpha	0.220E+03	20	?	0.183E-17	64Me03	*1)
W tip	Alpha	0.265E+03	20	?	0.152E-17	64Me03	*1)
W poly	Alpha	0.300E+03	300	O-	0.800E-17	79Ho06	
W poly	Alpha	0.400E+03	300	O-	0.660E-17	79Ho06	
W poly	Alpha	0.500E+03	300	O-	0.770E-17	79Ho06	
W poly	Alpha	0.600E+03	300	O-	0.660E-17	79Ho06	
W poly	Alpha	0.700E+03	300	O-	0.750E-17	79Ho06	
W poly	Alpha	0.800E+03	300	O-	0.790E-17	79Ho06	
W poly	Alpha	0.900E+03	?	O-	0.750E-17	79Ho06	
W poly	Alpha	0.100E+04	?	O-	0.690E-17	79Ho06	
Mo tip	Alpha	0.200E+02	20	?	0.350E-18	64Me02	
Mo poly	Alpha	0.500E+02	300	ion	0.425E-16	76Do01	*5)
Mo poly	Alpha	0.100E+03	300	ion	0.125E-15	76Do01	*5)
Mo poly	Alpha	0.100E+03	300	O+	0.400E-16	67De01	
Mo poly	Alpha	0.100E+03	300	O+	0.100E-15	64Re02	
Mo poly	Alpha	0.150E+03	300	ion	0.595E-16	76Do01	*5)
Mo poly	Alpha	0.200E+03	300	ion	0.525E-16	76Do01	*5)
Mo poly	Alpha	0.200E+03	300	CO	0.800E-16	64Re02	*6)

*1) work function
*2) incident angle ~90
*3) adsorption temp. ~100 K
*4) LEED gun
*5) spherical ion collector
*6) Full coverage

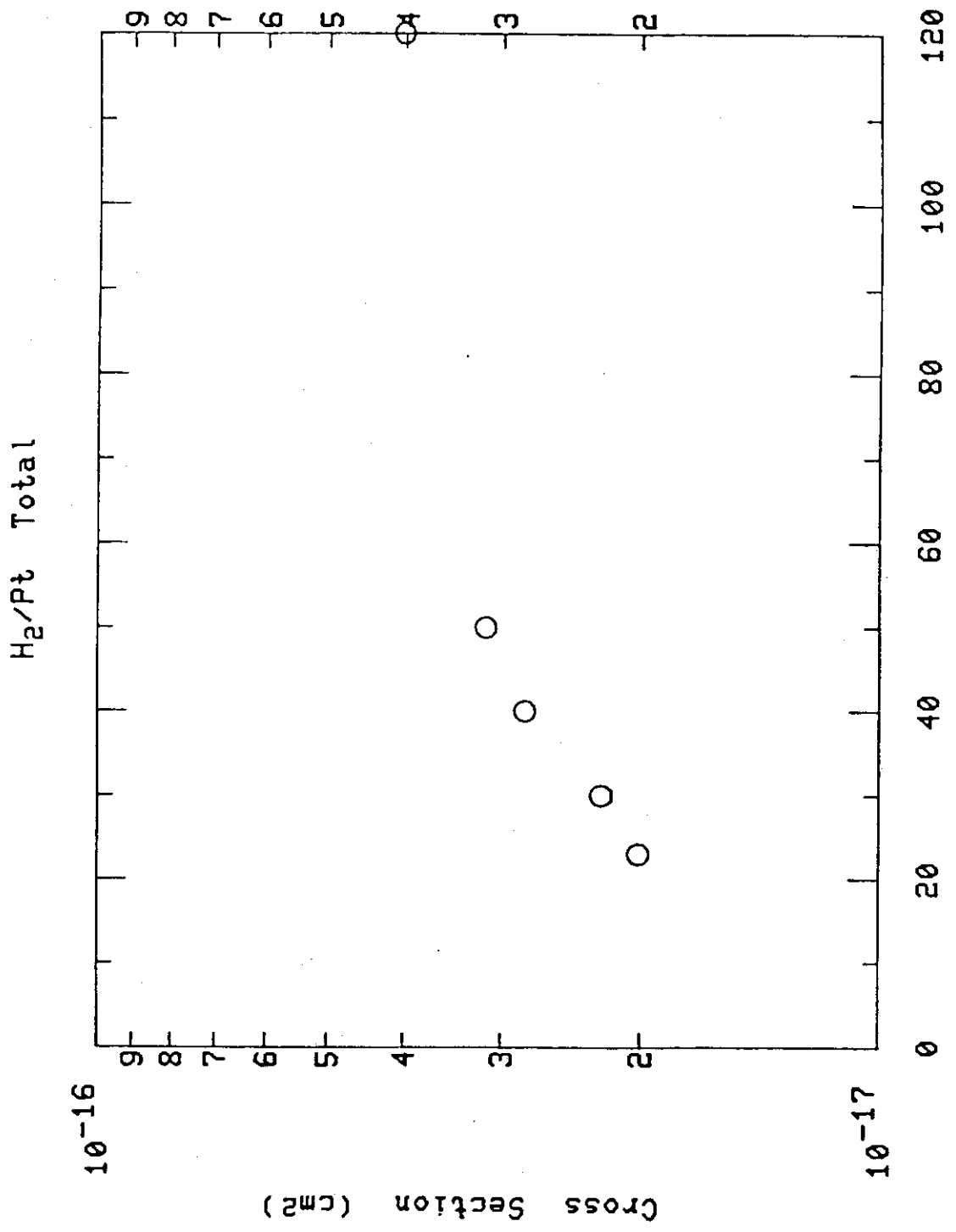

Fig.10 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
Pt	State 1	0.230E+02	70	H+	0.201E-16	70Hu03	*1)
Pt	State 1	0.300E+02	70	H+	0.224E-16	70Hu03	*1)
Pt	State 1	0.400E+02	70	H+	0.280E-16	70Hu03	*1)
Pt	State 1	0.500E+02	70	H+	0.314E-16	70Hu03	*1)
Pt	State 1	0.120E+03	70	H+	0.402E-16	70Hu03	*1)

*1) saturated level

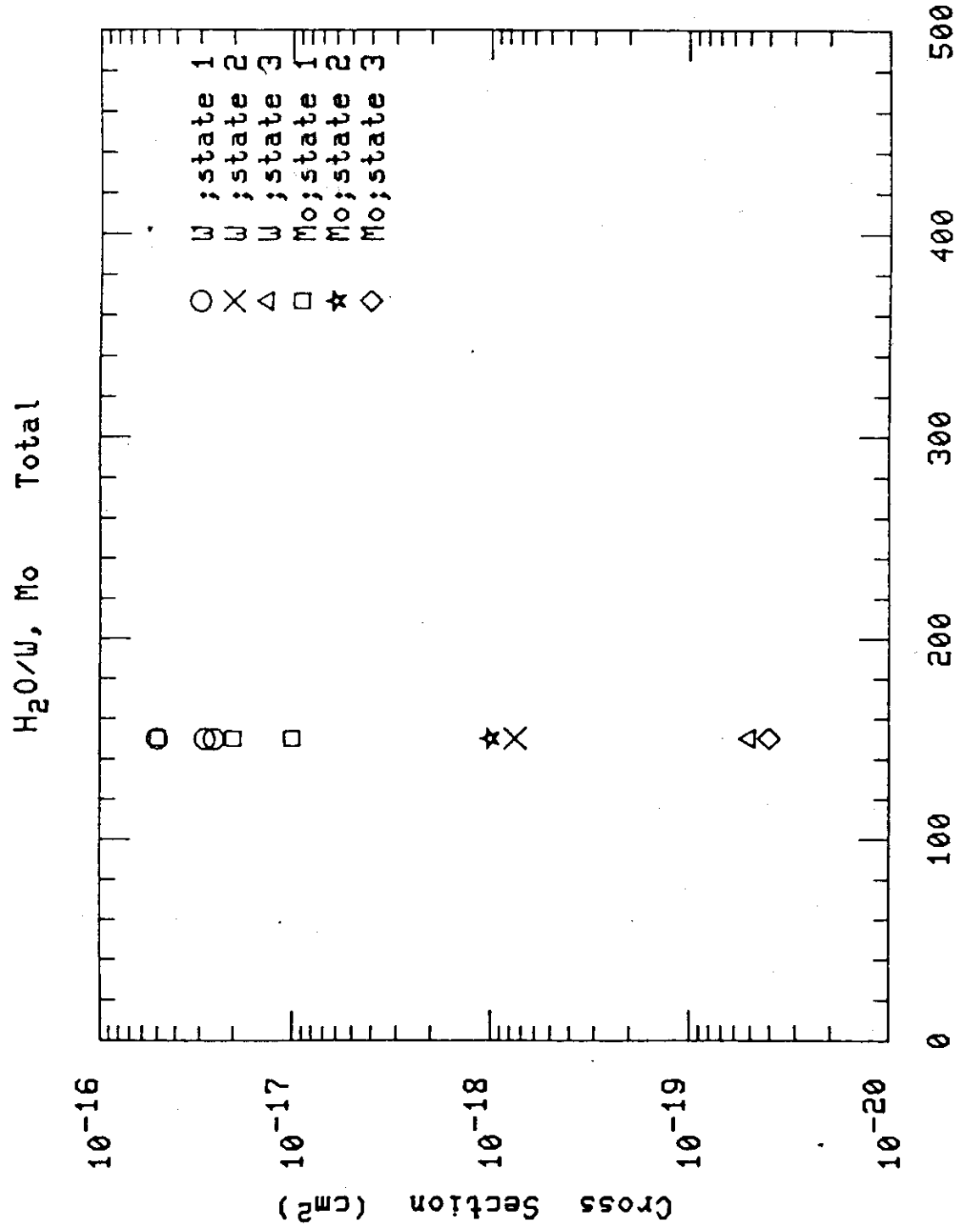

Fig.11 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
W poly	I	0.150E+03	430	O2	0.250E-16	70K103	
W poly	I	0.150E+03	430	H2	0.280E-16	70K103	
W poly	I	0.150E+03	430	H2O	0.500E-16	70K103	
W poly	II	0.150E+03	430	O	0.750E-18	70K103	
W poly	III	0.150E+03	430	O	0.500E-19	70K103	
Mo poly	I	0.150E+03	420	O2	0.100E-16	70K105	
Mo poly	I	0.150E+03	420	H2	0.200E-16	70K105	
Mo poly	I	0.150E+03	420	H2O	0.500E-16	70K105	
Mo poly	II	0.150E+03	420	O	0.100E-17	70K105	
Mo poly	III	0.150E+03	420	?	0.400E-19	70K105	

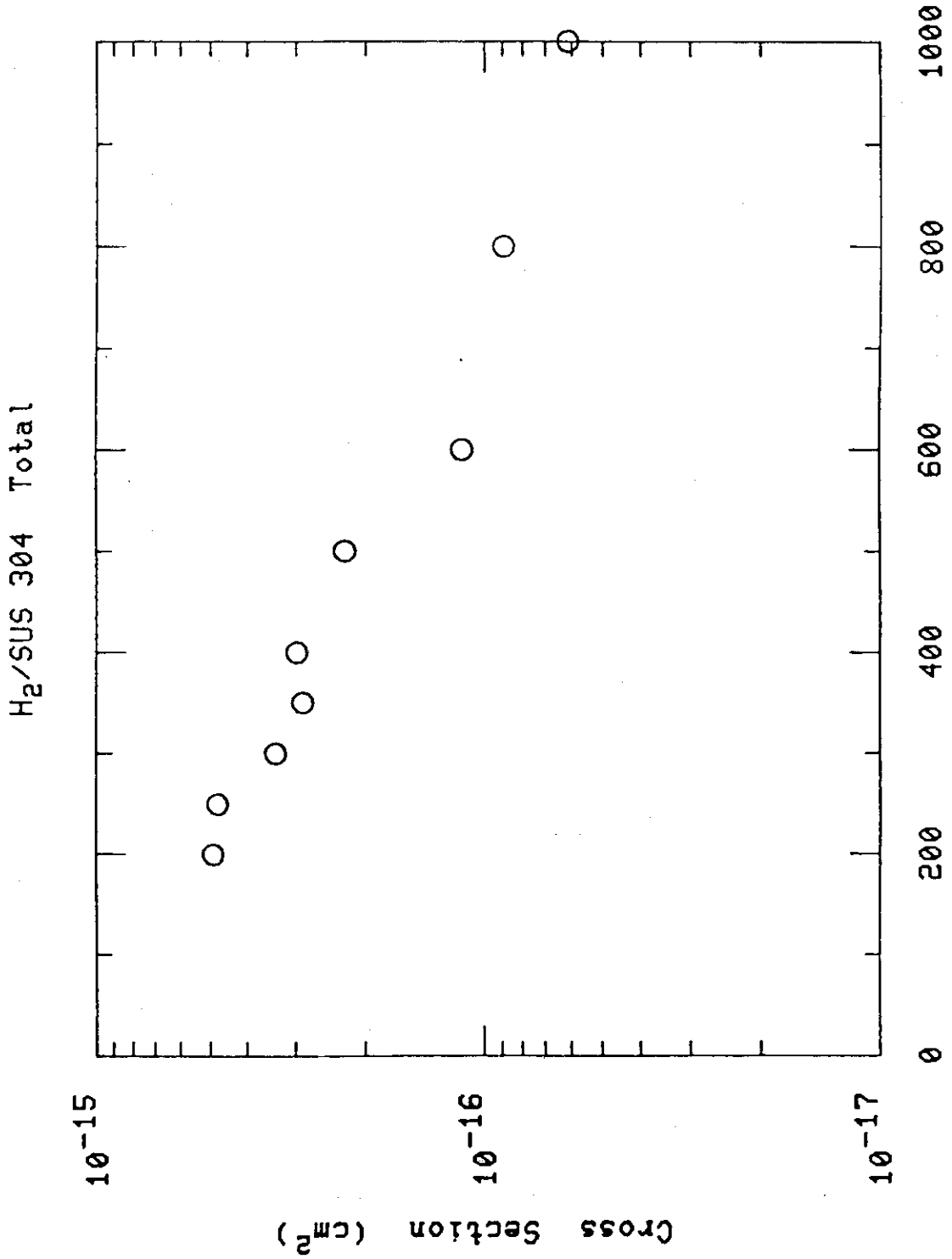

Fig.12 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
poly		0.200E+03	RT	H+	0.489E-15	78Dr03	*1)
poly		0.250E+03	RT	H+	0.477E-15	78Dr03	*1)
poly		0.300E+03	RT	H+	0.337E-15	78Dr03	*1)
poly		0.350E+03	RT	H+	0.287E-15	78Dr03	*1)
poly		0.400E+03	RT	H+	0.297E-15	78Dr03	*1)
poly		0.500E+03	RT	H+	0.225E-15	78Dr03	*1)
poly		0.600E+03	RT	H+	0.114E-15	78Dr03	*1)
poly		0.800E+03	RT	H+	0.899E-16	78Dr03	*1)
poly		0.100E+04	RT	H+	0.612E-16	78Dr03	*1)

*1) After degreasing, the sample was exposed to the atmosphere for several hours before it was placed inside the vacuum chamber. ESD studies were started after mild bakeout of the vacuum system

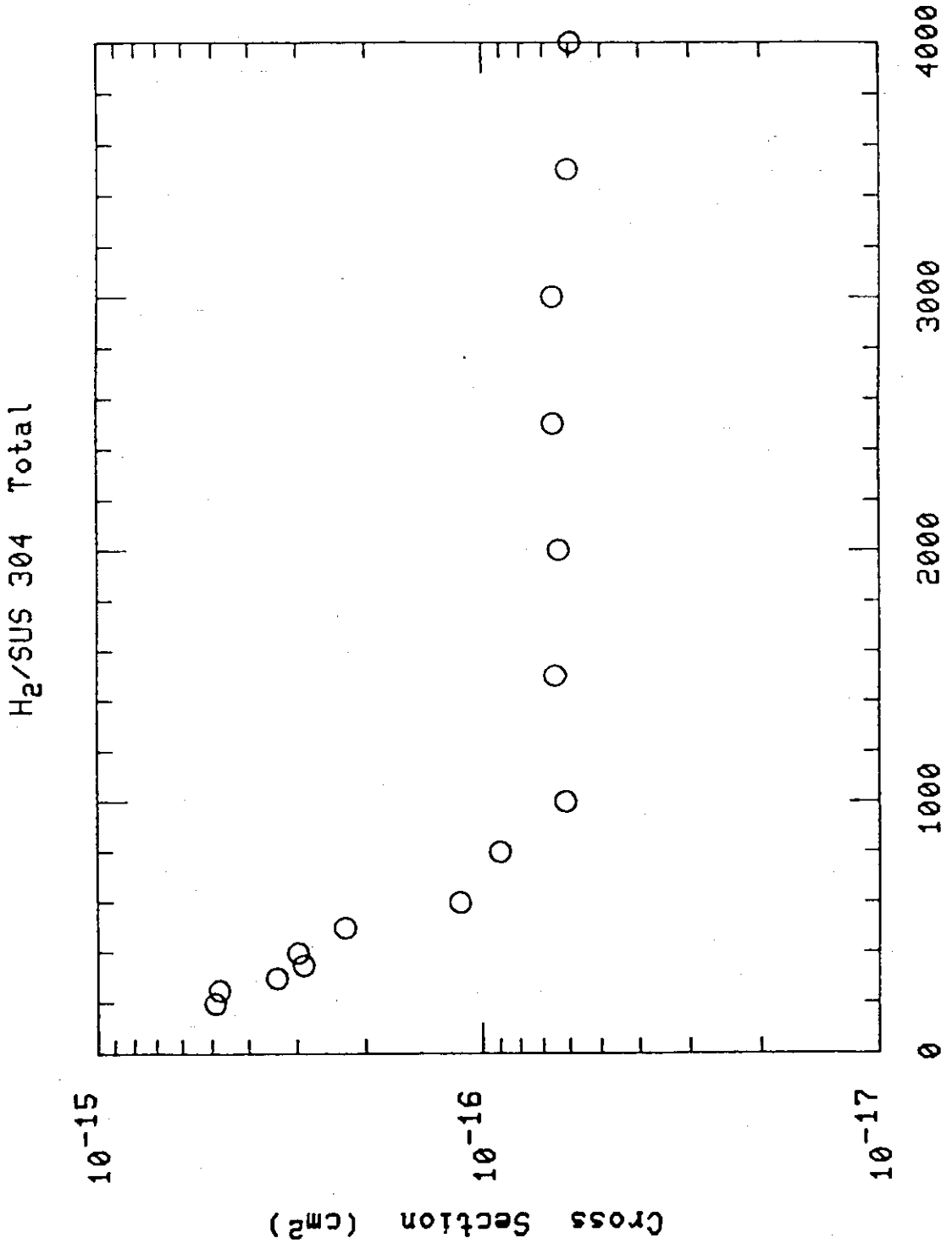

Fig.13 Total cross section as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
poly		0.200E+03	RT	H+	0.489E-15	78Dr03	
poly		0.250E+03	RT	H+	0.477E-15	78Dr03	
poly		0.300E+03	RT	H+	0.337E-15	78Dr03	
poly		0.350E+03	RT	H+	0.287E-15	78Dr03	
poly		0.400E+03	RT	H+	0.297E-15	78Dr03	
poly		0.500E+03	RT	H+	0.225E-15	78Dr03	
poly		0.600E+03	RT	H+	0.114E-15	78Dr03	
poly		0.800E+03	RT	H+	0.899E-16	78Dr03	
poly		0.100E+04	RT	H+	0.612E-16	78Dr03	
poly		0.150E+04	RT	H+	0.651E-16	78Dr03	
poly		0.200E+04	RT	H+	0.638E-16	78Dr03	
poly		0.250E+04	RT	H+	0.660E-16	78Dr03	
poly		0.300E+04	RT	H+	0.664E-16	78Dr03	
poly		0.350E+04	RT	H+	0.608E-16	78Dr03	
poly		0.400E+04	RT	H+	0.594E-16	78Dr03	

2.3.3 Graphs and Data Lists for Desorption Cross Sections of Ionic Species

The cross sections for desorption of ioninc species are shown in Figs.14-19. The cross sections are high for weakly bound adsorbates as well as the total cross sections. The cross sections for ionic desorption are smaller than the total desorption cross sections.[see Figs.1-13] It is difficult to discuss the dependence of the cross section on incident energy due to the lack of compiled data.

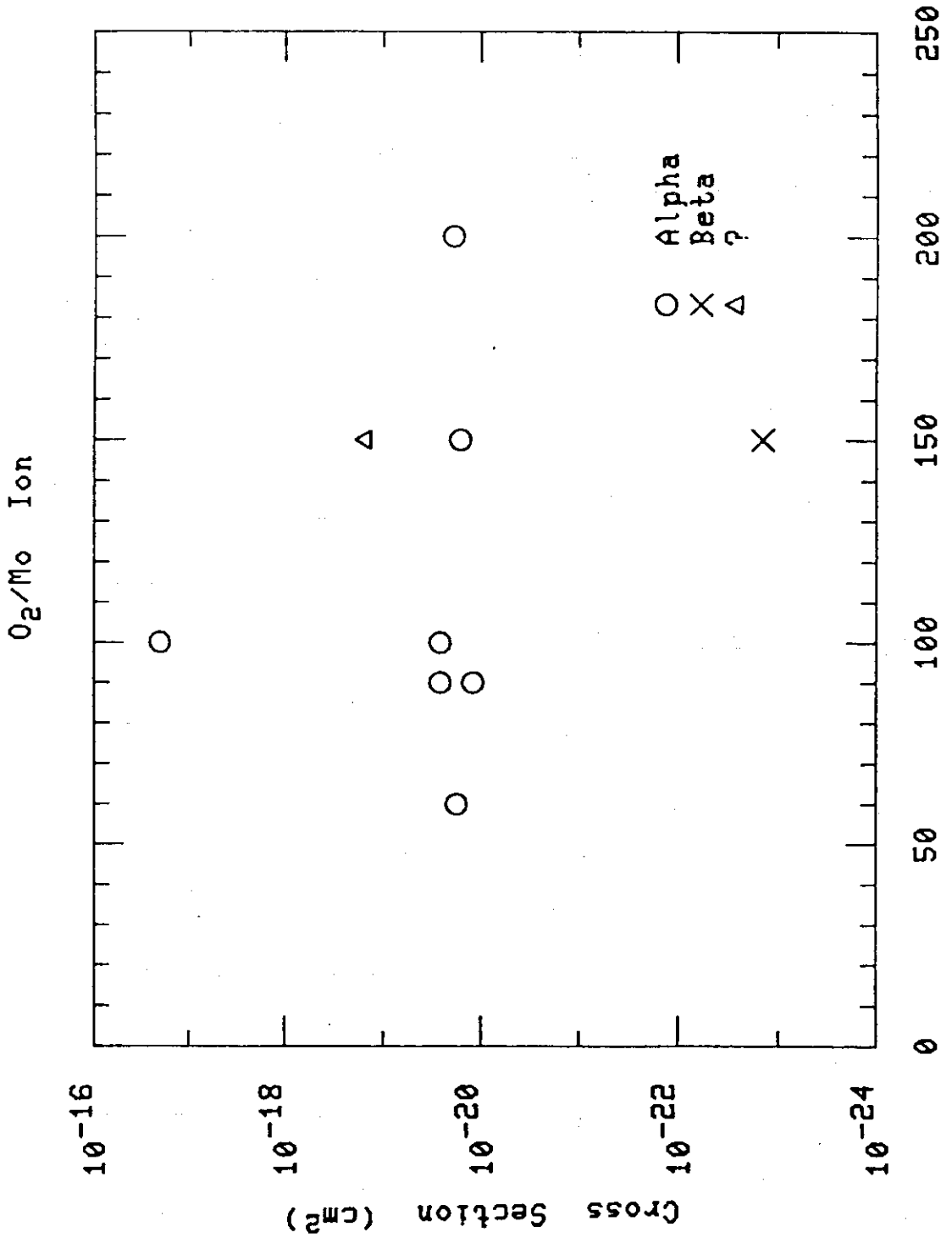

Fig.14 Desorption cross section for ionic species as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ionic cross section(cm**2)	Ref.	Remark
poly	Alpha	0.600E+02	300	O+	0.176E-19	64Re03	*1)
poly	Alpha	0.900E+02	300	?	0.120E-19	63Re01	*2)
poly	Alpha	0.900E+02	300	?	0.260E-19	64Re03	*1)
poly	Alpha	0.100E+03	300	?	0.260E-19	64Re03	*1)
poly	Alpha	0.100E+03	?	?	0.200E-16	66Li05	*3)
poly	Alpha	0.150E+03	420	O+	0.160E-19	70Kl05	*1)
poly	Alpha	0.200E+03	?	O+	0.192E-19	64Re03	*1)
poly	Beta	0.150E+03	?	?	0.140E-22	64Re03	
poly	?	0.150E+03	420	O+	0.150E-18	70Kl05	state 1

*1) 5E+14 mol/cm**2
*2) 1E+15 mol/cm**2
*3) 2E+14 mol/cm**2

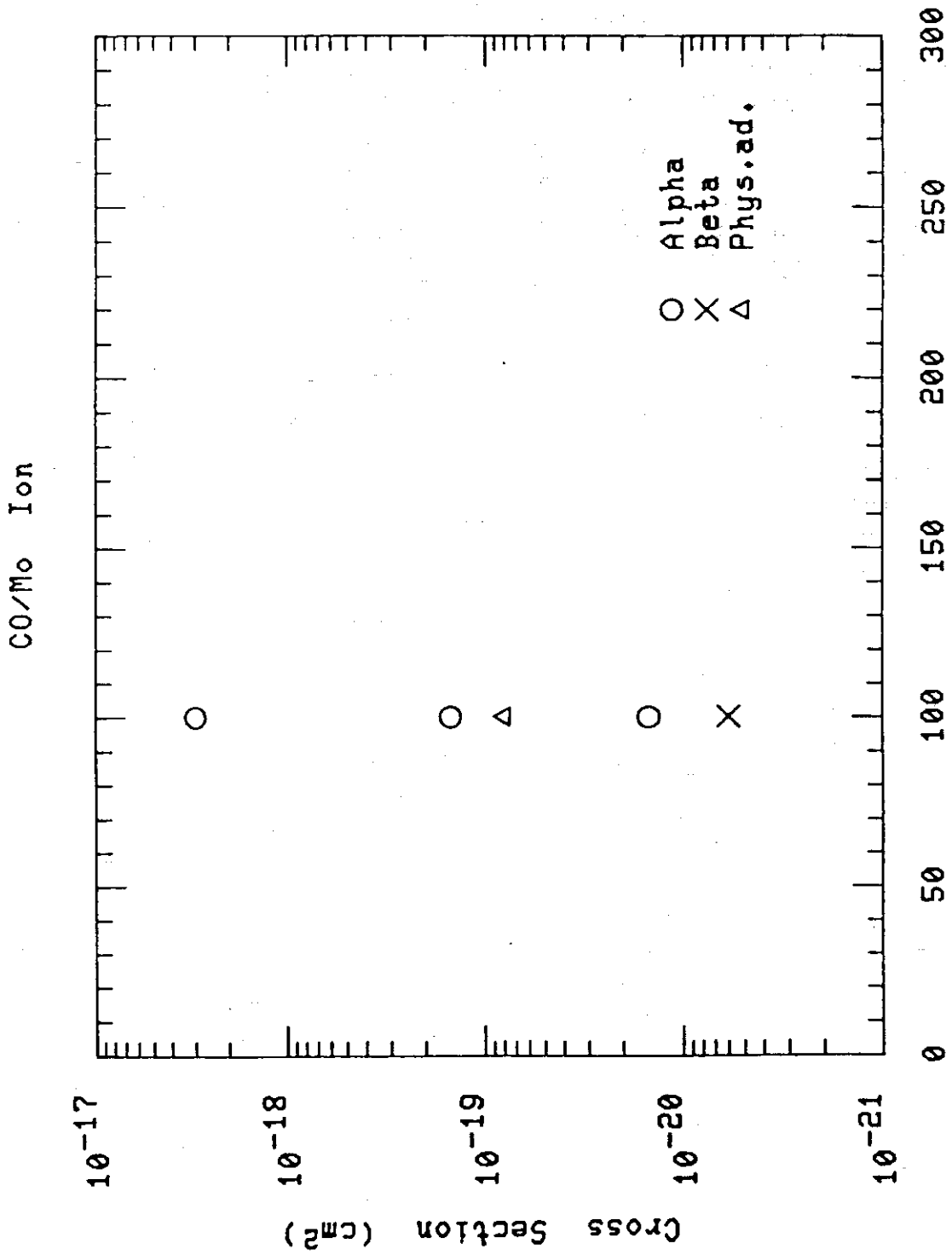

Fig.15 Desorption cross section for ionic species as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ionic cross section(cm**2)	Ref.	Remark
poly	Alpha	0.100E+03	300	O+	0.150E-18	67De01	
poly	Alpha	0.100E+03	300	O+	0.300E-17	66Li04	*1)
poly	Alpha	0.100E+03	300	O+	0.150E-19	64Re02	*2)
poly	Beta	0.100E+03	300	O+	0.600E-20	66Li04	*3)
poly	Phys.ad.	0.100E+03	300	CO+	0.800E-19	67De01	

*1) 4.4E+13 mol/cm**2
*2) 2E+13 mol/cm**2
*3) EPSMS

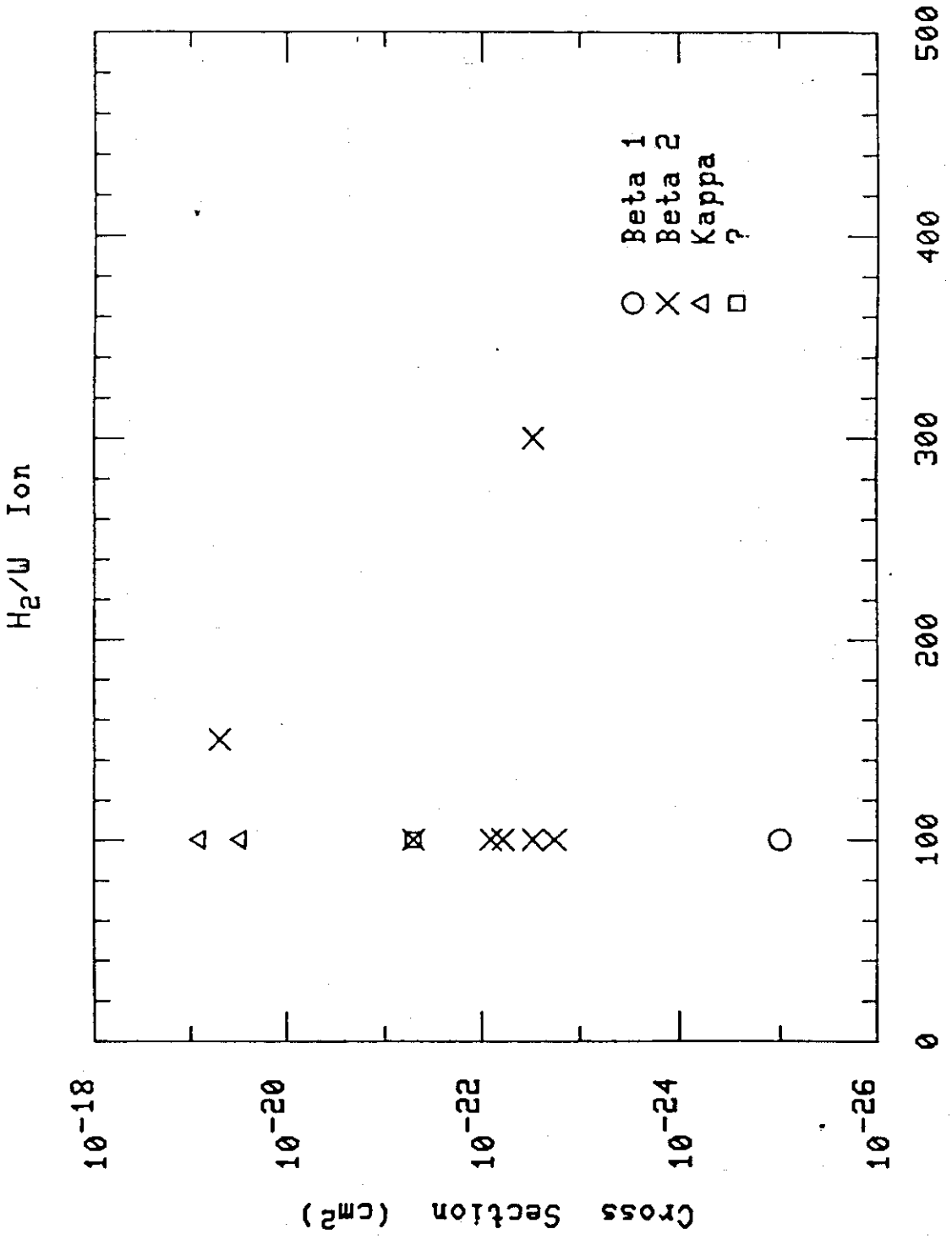

Fig.16 Desorption cross section for ionic species as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ionic cross section(cm**2)	Ref.	Remark
100	Beta 1	0.100E+03	260	H+	0.100E-25	77Ja02	*1)
100	Beta 1	0.100E+03	<330	?	0.100E-24	73Ma10	*1)
poly	Beta 1	0.100E+03	300	H+	0.100E-24	75Me10	
100	Beta 2	0.100E+03	260	H+	0.600E-22	73Je01	*2)
100	Beta 2	0.100E+03	260	H+	0.800E-22	73Je03	*3)
110	Beta 2	0.100E+03	280	H+	0.500E-21	73Ki02	
100	Beta 2	0.100E+03	<330	?	0.180E-22	73Ma10	*3)
100	Beta 2	0.100E+03	20-150	?	0.600E-22	75Me09	*4)
110	Beta 2	0.100E+03	20-150	?	0.500E-21	75Me09	*4)
poly	Beta 2	0.100E+03	300	H+	0.300E-22	70Ni03	*4)
poly	Beta 2	0.150E+03	430	H+	0.500E-19	70Kl04	*5)
poly	Beta 2	0.300E+03	?	H+	0.300E-22	75Me10	
100	Kappa	0.100E+03	300	H+	0.800E-19	73Je01	*2)
100	Kappa	0.100E+03	300	neutral	0.300E-19	74Je04	
100	?	0.100E+03	<330	H+	0.500E-21	75Ma12	*6)

*1) 2E+15 mol/cm**2
*2) ref. 70Me07
*3) 3.4E+14 mol/cm**2
*4) 2E+14 mol/cm**2
*5) 2.4E+14 mol/cm**2
*6) work function

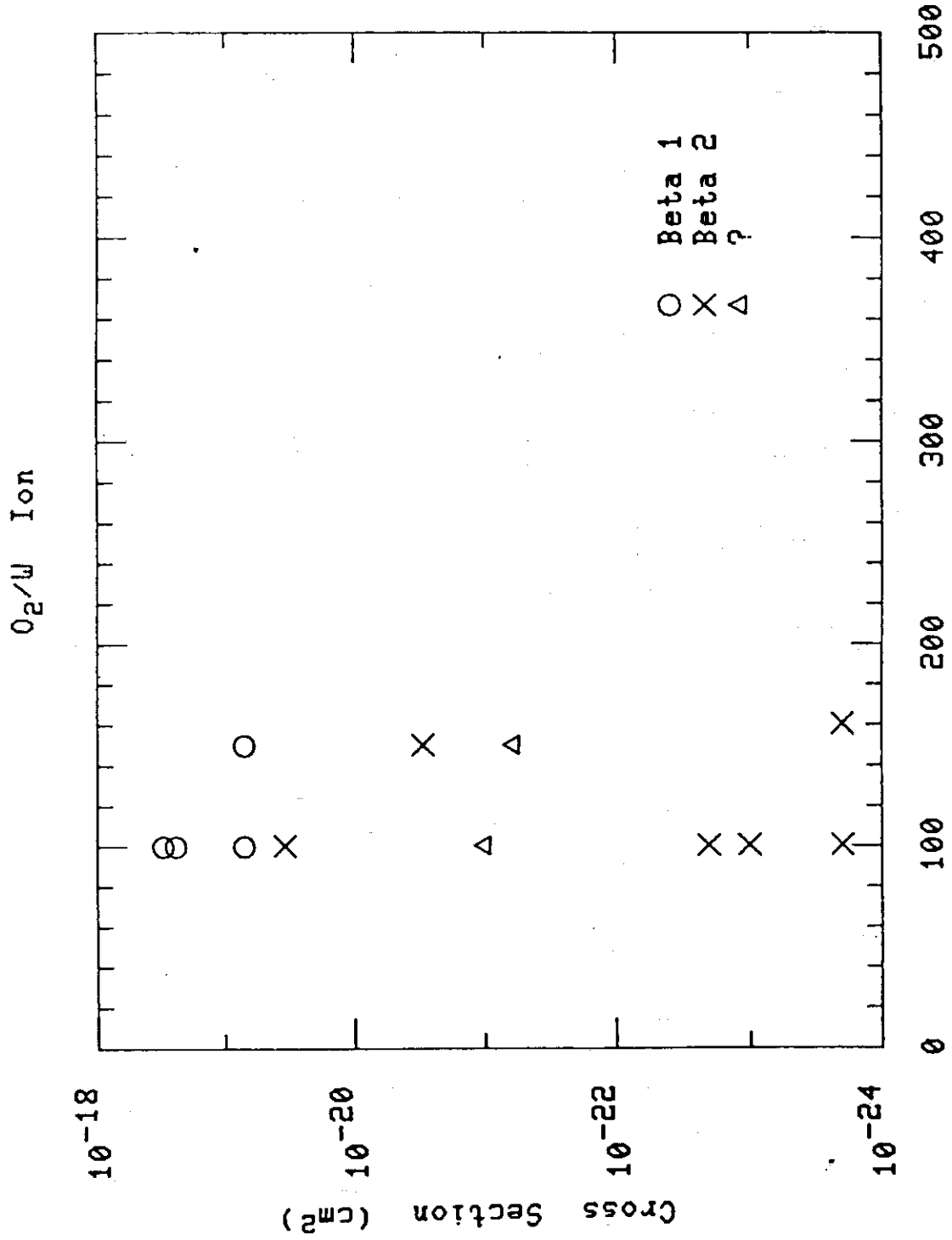

Fig.17 Desorption cross section for ionic species as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ionic cross section(cm**2)	Ref.	Remark
100	Beta 1	0.100E+03	300	O+	0.240E-18	76Ag04	180 L
poly	Beta 1	0.100E+03	300	O+	0.700E-19	72Lo02	*1)
poly	Beta 1	0.100E+03	300	O+	0.300E-18	70Ni03	*2)
poly	Beta 1	0.150E+03	430	O+	0.700E-19	70K102	*3)
100	Beta 2	0.100E+03	300	O+	0.100E-22	76Ag06	0.1 L
poly	Beta 2	0.100E+03	?	O+	0.340E-19	68Ma01	*4)
poly	Beta 2	0.100E+03	?	O+	0.200E-22	68Ma01	*5)
poly	Beta 2	0.100E+03	300	O+	0.200E-23	70Ni03	*6)
poly	Beta 2	0.150E+03	430	O+	0.300E-20	70K102	*7)
100	Beta 2	0.160E+03	300	O+	0.200E-23	78Pr02	*8)
poly	?	0.100E+03	300	?	0.100E-20	67Ya01	*9)
110	?	0.150E+03	100	O+	0.600E-21	77Le04	*10)

*1) 3.82E+14 mol/cm**2
*2) 3E+13 mol/cm**2
*3) 1.5E+13 mol/cm**2
*4) 1.4E+13 mol/cm**2
*5) 2.5E+14 mol/cm**2
*6) 5E+14 mol/cm**2
*7) 3E+14 mol/cm**2
*8) 5E+14 mol/cm**2 =0.5ML
*9) 7E+14 mol/cm**2
*10) REF.77St02

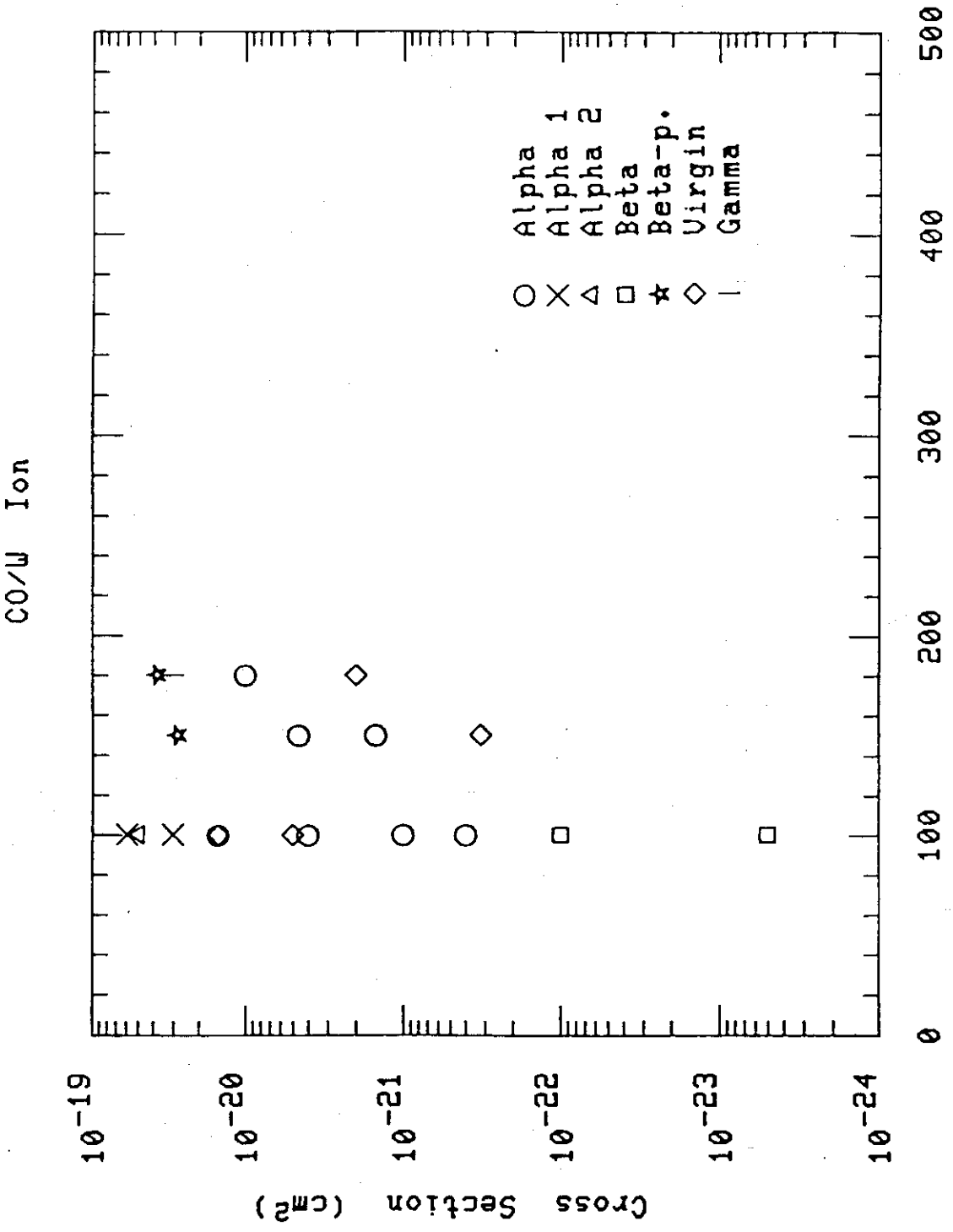

Fig.18 Desorption cross section for ionic species as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ionic cross section(cm**2)	Ref.	Remark
poly	Alpha	0.100E+03	300	?	0.400E-20	73Go02	*1)
poly	Alpha	0.100E+03	300	CO+/O+	0.150E-19	70Ni03	
poly	Alpha	0.100E+03	300	CO+	0.400E-21	70Ni03	*2)
poly	Alpha	0.100E+03	?	?	0.100E-20	67Ya01	*3)
poly	Alpha	0.150E+03	300	O+	0.150E-20	67Re04	
110	Alpha	0.150E+03	20	?	0.460E-20	77Le04	*12)
110	Alpha	0.180E+03	20	CO+	0.100E-19	77Le05	*4)
poly	Alpha 1	0.100E+03	20	?	0.300E-19	68Me04	*5)
100	Alpha 1	0.100E+03	?	CO+	0.600E-19	75Me10	*6)
100	Alpha 2	0.100E+03	?	O+	0.500E-19	75Me10	*7)
poly	Alpha 2	0.100E+03	20	?	0.500E-19	68Me04	*2)
poly	Beta	0.100E+03	?	O+	0.100E-21	68Me04	*8)
poly	Beta	0.100E+03	300	CO+	0.500E-23	70Ni03	*2)
110	Beta-p.	0.150E+03	20	?	0.280E-19	77Le04	*9)
110	Beta-p.	0.180E+03	20	O+	0.380E-19	77Le05	*9)
poly	Virgin	0.100E+03	300	CO+	0.500E-20	70Ni03	*5)
poly	Virgin	0.100E+03	300	CO+	0.150E-19	67Re04	
110	Virgin	0.150E+03	20	?	0.325E-21	77Le04	*10)
110	Virgin	0.180E+03	20~250	CO+	0.200E-20	77Le05	*10)
100	Gamma	0.100E+03	?	?	0.800E-19	75Me09	
?	Gamma	0.180E+03	20	CO+	0.300E-19	?	*11)

*1) work function
*2) 2E+14 mol/cm**2
*3) coexsistance with Beta 1
*4) 0.30E+15 mol/cm**2
*5) 1.5E+14 mol/cm**2
*6) coexsistance with virgin
*7) coexsistance with Beta-p
*8) 3E+14 mol/cm**2
*9) 0.05E+15 mol/cm**2
*10) 1.14E+15 mol/cm**2
*11) 0.15E+15 mol/cm**2
*12) LEED gun

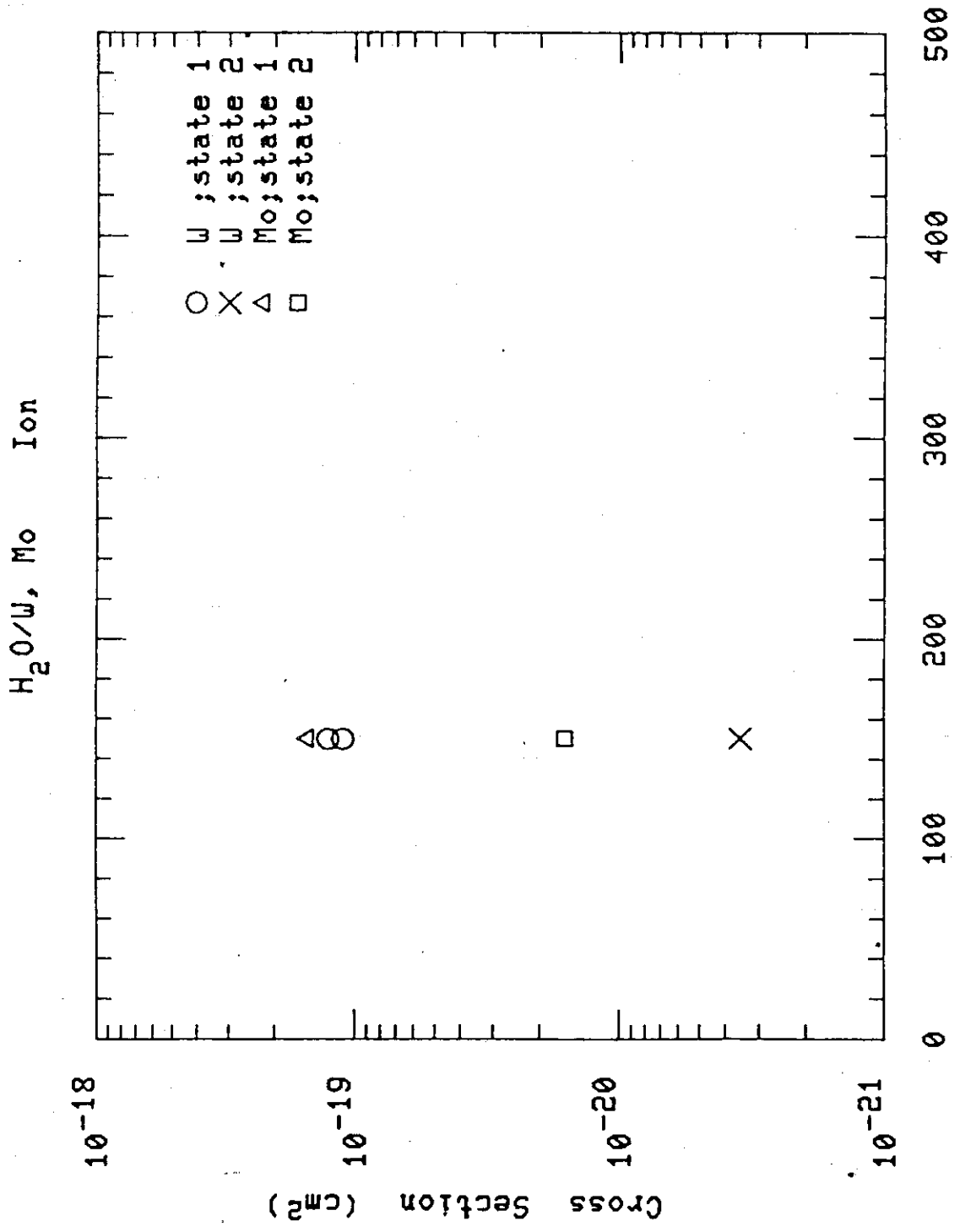

Fig.19 Desorption cross section for ionic species as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ionic cross section(cm**2)	Ref.	Remark
W poly	W ; I	0.150E+03	430	O+	0.110E-18	70K103	
W poly	W ; I	0.150E+03	430	H+	0.125E-18	70K103	
W poly	W ; II	0.150E+03	430	O+	0.350E-20	70K103	
Mo poly	Mo; I	0.150E+03	420	H+	0.150E-18	70K105	
Mo poly	Mo; II	0.150E+03	420	O+	0.160E-19	70K105	

2.3.4 Graphs and Data Lists for Desorption Efficiencies

The desorbed ions and nutrals are identified by mass spectrometers; i.e., magnetic sectors, quadrupole mass analyzer, etc. The desorption efficiencies for identified ions and neutrals are presented in Figs.20-38. The possible desorbed species can be readily expected by referring to Table 3. Desorption efficiencies for neutral species are about one hundred times as large as those for ions. [see, Figs. 20 and 36]

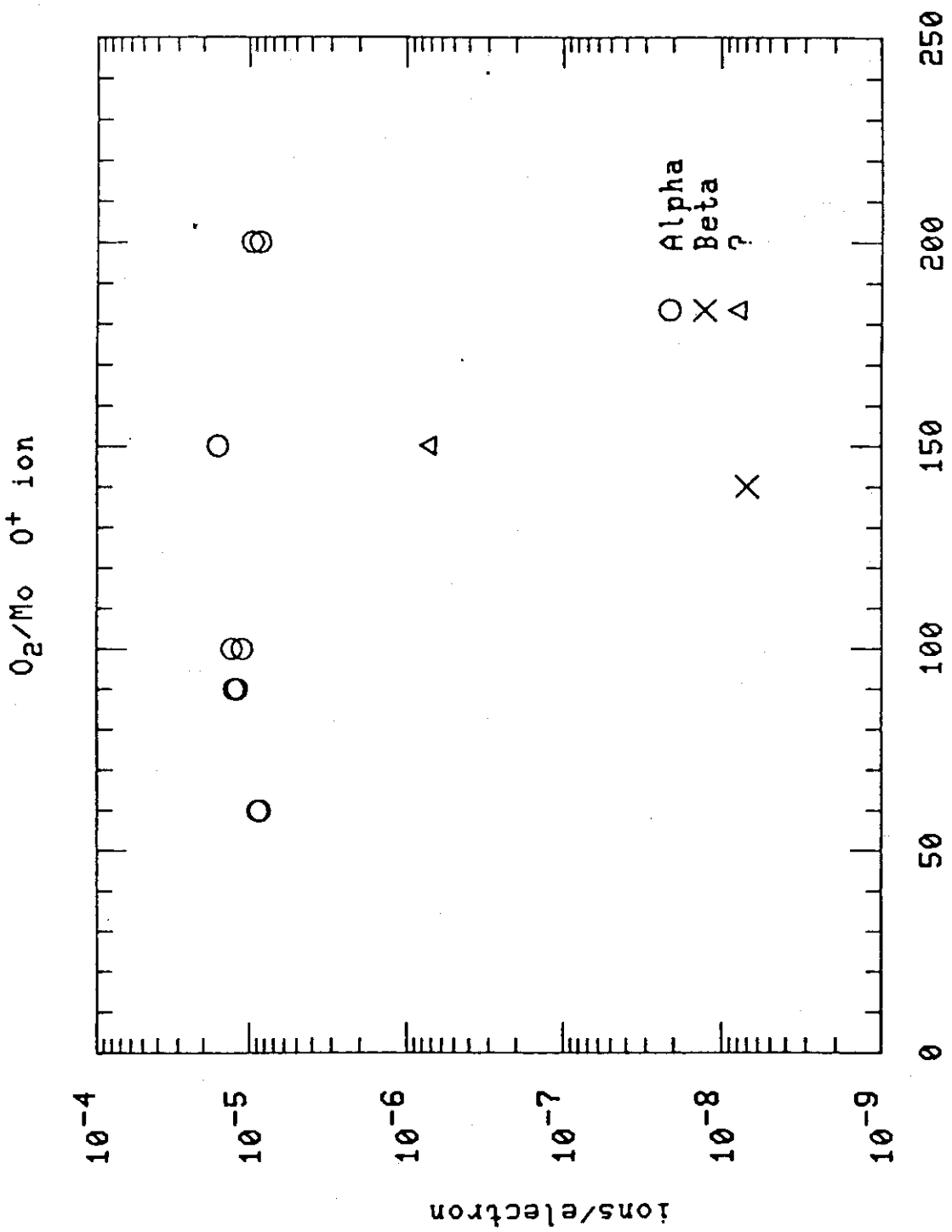

Fig.20 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	Alpha	0.600E+02	300	O+	0.880E-05	64Re03	*1)
poly	Alpha	0.600E+02	300	O+	0.855E-05	63Re01	*2)
poly	Alpha	0.900E+02	300	O+	0.120E-04	63Re01	*4)
poly	Alpha	0.900E+02	300	O+	0.125E-04	64Re03	*1)
poly	Alpha	0.100E+03	300	O+	0.130E-04	64Re03	
poly	Alpha	0.100E+03	300	O+	0.111E-04	64Re01	*2)
poly	Alpha	0.150E+03	300	O+	0.160E-04	70K105	*5)
poly	Alpha	0.200E+03	300	O+	0.960E-05	64Re03	*5)
poly	Alpha	0.200E+03	300	O+	0.850E-05	64Re01	*2)
poly	Beta	0.140E+03	300	O+	0.700E-08	64Re03	
poly	?	0.150E+03	420	O+	0.700E-06	70K105	*3)

*1) 5E+14 atms/cm**2
*2) 1E+15 atms/cm**2
*3) very loosely bound state
*4) 1E+15 mol/cm**2
*5) 5E+14 mol/cm**2

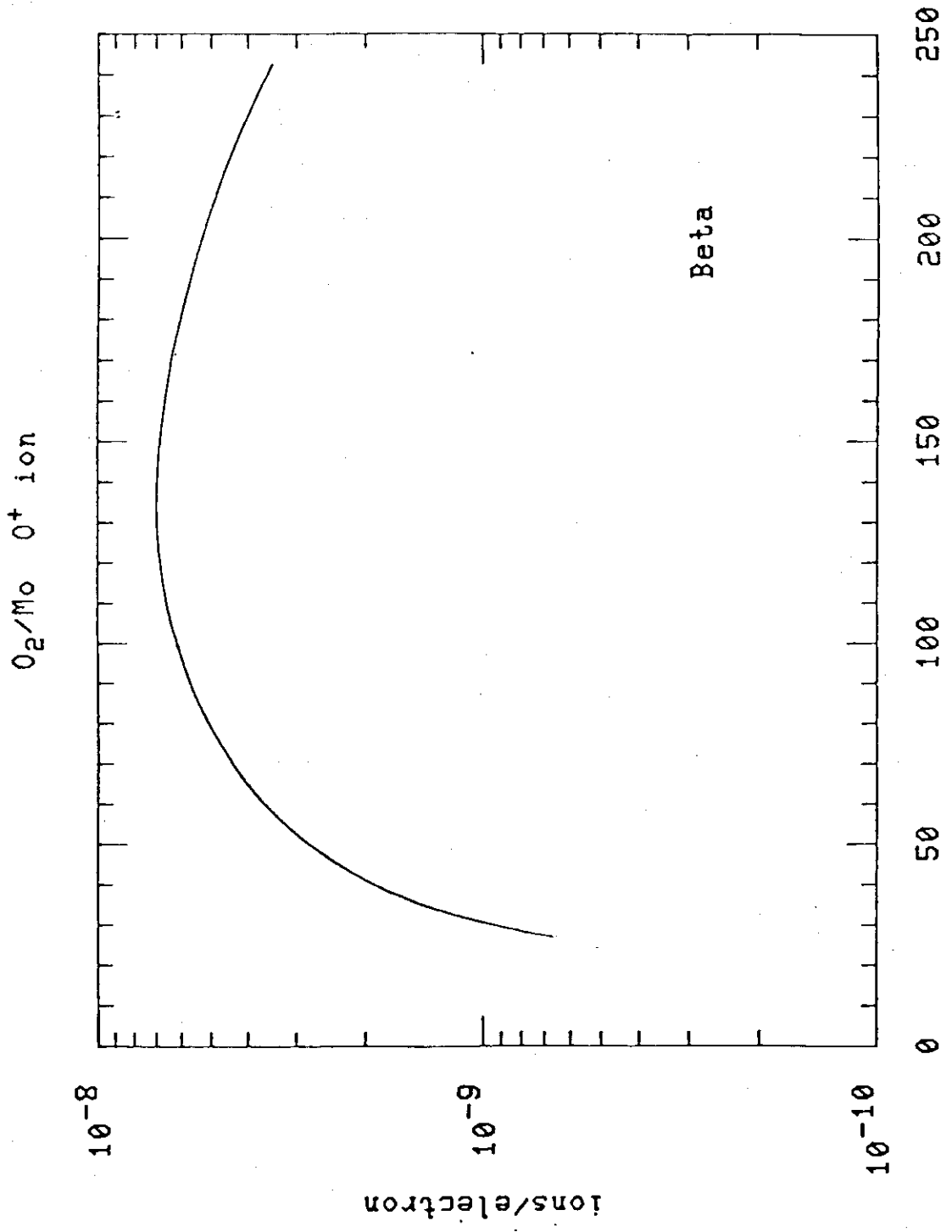

Fig.21 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	Beta	0.280E+02	300	O+	0.683E-09	64Re03	
poly	Beta	0.320E+02	300	O+	0.125E-08	64Re03	
poly	Beta	0.390E+02	300	O+	0.189E-08	64Re03	
poly	Beta	0.470E+02	300	O+	0.252E-08	64Re03	
poly	Beta	0.550E+02	300	O+	0.325E-08	64Re03	
poly	Beta	0.630E+02	300	O+	0.391E-08	64Re03	
poly	Beta	0.800E+02	300	O+	0.515E-08	64Re03	
poly	Beta	0.875E+02	300	O+	0.566E-08	64Re03	
poly	Beta	0.100E+03	300	O+	0.629E-08	64Re03	
poly	Beta	0.115E+03	300	O+	0.679E-08	64Re03	
poly	Beta	0.120E+03	300	O+	0.694E-08	64Re03	
poly	Beta	0.130E+03	300	O+	0.700E-08	64Re03	
poly	Beta	0.145E+03	300	O+	0.700E-08	64Re03	
poly	Beta	0.160E+03	300	O+	0.686E-08	64Re03	
poly	Beta	0.175E+03	300	O+	0.640E-08	64Re03	
poly	Beta	0.190E+03	300	O+	0.601E-08	64Re03	
poly	Beta	0.200E+03	300	O+	0.553E-08	64Re03	
poly	Beta	0.210E+03	300	O+	0.511E-08	64Re03	
poly	Beta	0.220E+03	300	O+	0.465E-08	64Re03	
poly	Beta	0.240E+03	300	O+	0.371E-08	64Re03	

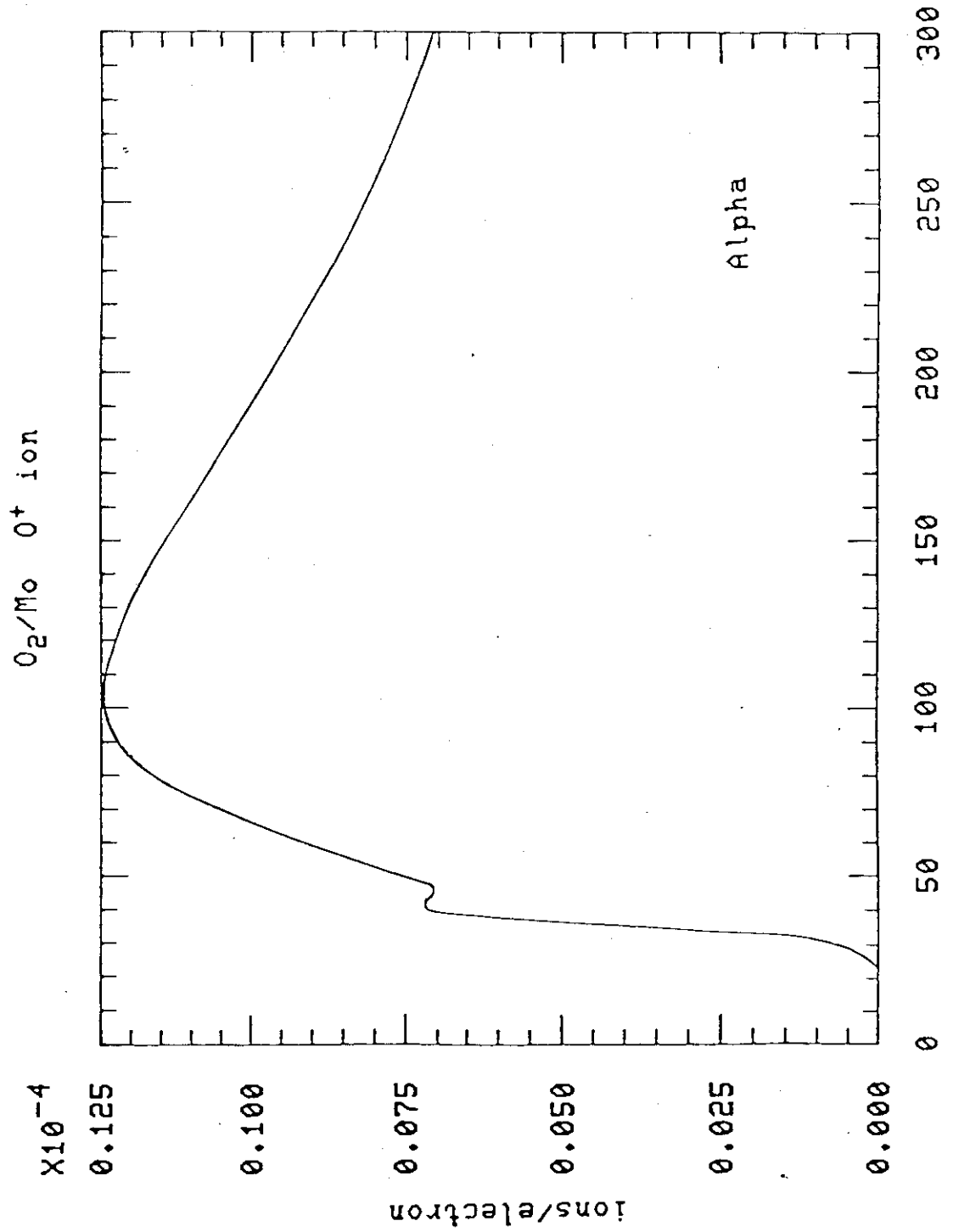

Fig.22 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	Alpha	0.230E+02	300	O+	0.173E-06	64Re03	
poly	Alpha	0.300E+02	300	O+	0.909E-06	64Re03	
poly	Alpha	0.350E+02	300	O+	0.421E-05	64Re03	
poly	Alpha	0.410E+02	300	O+	0.716E-05	64Re03	
poly	Alpha	0.445E+02	300	O+	0.708E-05	64Re03	
poly	Alpha	0.460E+02	300	O+	0.708E-05	64Re03	
poly	Alpha	0.480E+02	300	O+	0.726E-05	64Re03	
poly	Alpha	0.485E+02	300	O+	0.743E-05	64Re03	
poly	Alpha	0.500E+02	300	O+	0.775E-05	64Re03	
poly	Alpha	0.590E+02	300	O+	0.898E-05	64Re03	
poly	Alpha	0.830E+02	300	O+	0.118E-04	64Re03	
poly	Alpha	0.890E+02	300	O+	0.121E-04	64Re03	
poly	Alpha	0.960E+02	300	O+	0.123E-04	64Re03	
poly	Alpha	0.100E+03	300	O+	0.124E-04	64Re03	
poly	Alpha	0.130E+03	300	O+	0.120E-04	64Re03	
poly	Alpha	0.160E+03	300	O+	0.111E-04	64Re03	
poly	Alpha	0.180E+03	300	O+	0.104E-04	64Re03	
poly	Alpha	0.200E+03	300	O+	0.951E-05	64Re03	
poly	Alpha	0.255E+03	300	O+	0.813E-05	64Re03	
poly	Alpha	0.300E+03	300	O+	0.707E-05	64Re03	

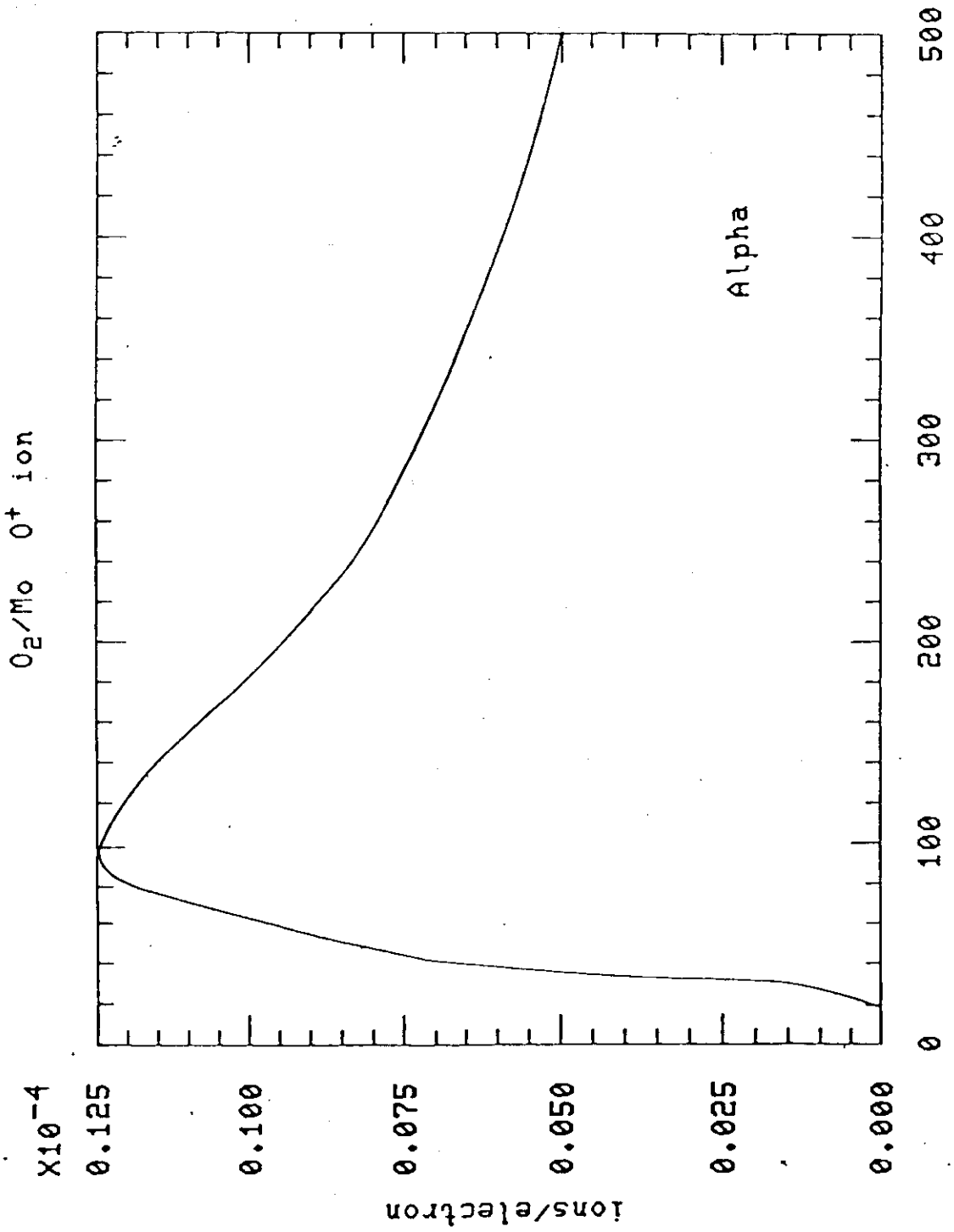

Fig.23 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	Alpha	0.200E+02	300	O+	0.236E-06	63Re01	
poly	Alpha	0.270E+02	300	O+	0.864E-06	63Re01	
poly	Alpha	0.300E+02	300	O+	0.231E-05	63Re01	
poly	Alpha	0.360E+02	300	O+	0.510E-05	63Re01	
poly	Alpha	0.405E+02	300	O+	0.715E-05	63Re01	
poly	Alpha	0.520E+02	300	O+	0.863E-05	63Re01	
poly	Alpha	0.630E+02	300	O+	0.982E-05	63Re01	
poly	Alpha	0.700E+02	300	O+	0.109E-04	63Re01	
poly	Alpha	0.800E+02	300	O+	0.120E-04	63Re01	
poly	Alpha	0.840E+02	300	O+	0.123E-04	63Re01	
poly	Alpha	0.100E+03	300	O+	0.124E-04	63Re01	
poly	Alpha	0.110E+03	300	O+	0.122E-04	63Re01	
poly	Alpha	0.115E+03	300	O+	0.122E-04	63Re01	
poly	Alpha	0.130E+03	300	O+	0.118E-04	63Re01	
poly	Alpha	0.190E+03	300	O+	0.974E-05	63Re01	
poly	Alpha	0.230E+03	300	O+	0.875E-05	63Re01	
poly	Alpha	0.305E+03	300	O+	0.708E-05	63Re01	
poly	Alpha	0.350E+03	300	O+	0.646E-05	63Re01	
poly	Alpha	0.400E+03	300	O+	0.587E-05	63Re01	
poly	Alpha	0.500E+03	300	O+	0.496E-05	63Re01	

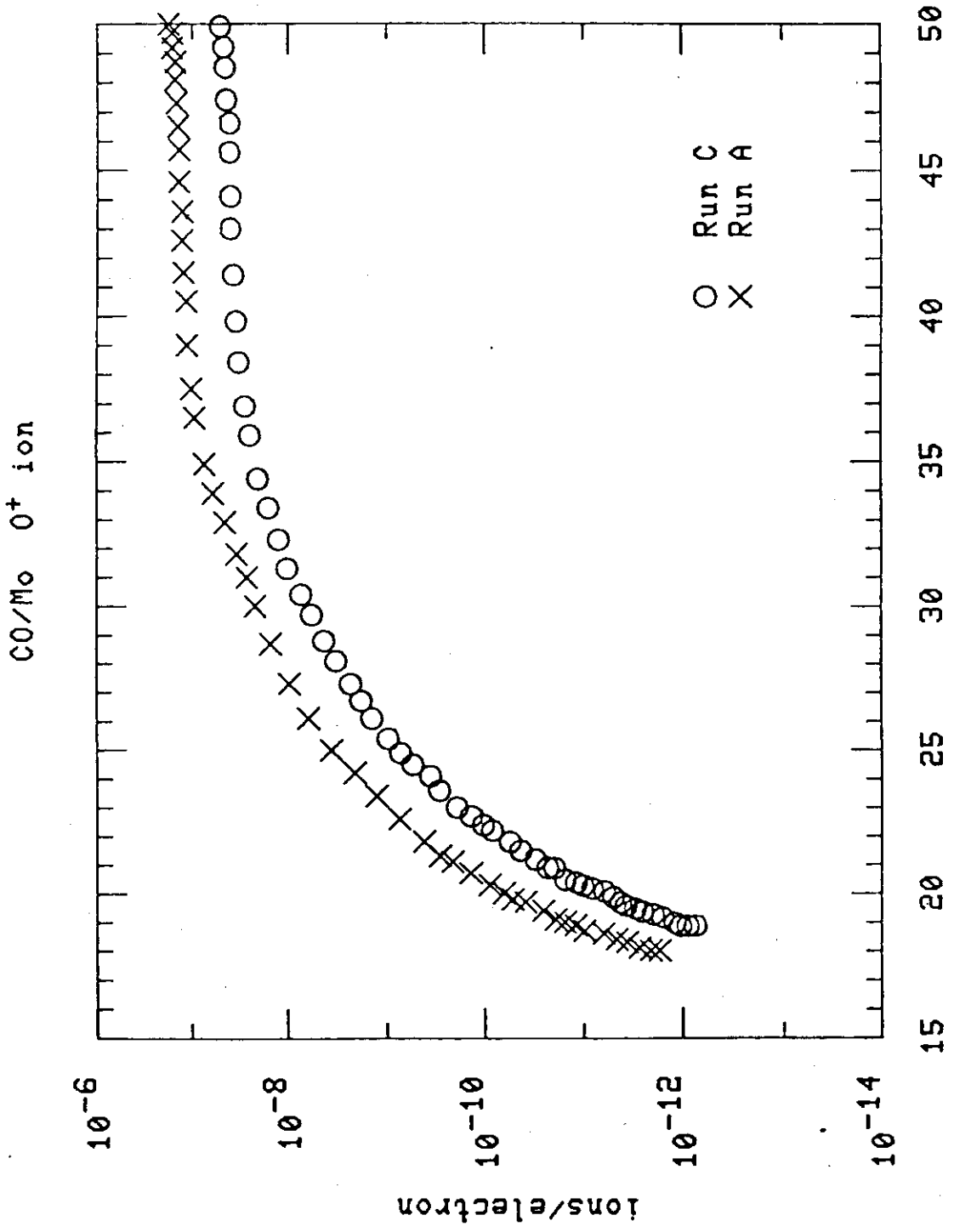

Fig.24 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	Run C	0.190E+02	300	O+	0.119E-11	61Mo02	*1)
poly	Run C	0.195E+02	300	O+	0.298E-11	61Me02	*1)
poly	Run C	0.200E+02	300	O+	0.606E-11	61Me02	*1)
poly	Run C	0.205E+02	300	O+	0.152E-10	61Me02	*1)
poly	Run C	0.210E+02	300	O+	0.230E-10	61Mo02	*1)
poly	Run C	0.215E+02	300	O+	0.430E-10	61Mo02	*1)
poly	Run C	0.220E+02	300	O+	0.837E-10	61Mo02	*1)
poly	Run C	0.230E+02	300	O+	0.192E-09	61Mo02	*1)
poly	Run C	0.240E+02	300	O+	0.358E-09	61Mo02	*1)
poly	Run C	0.250E+02	300	O+	0.725E-09	61Mo02	*1)
poly	Run C	0.260E+02	300	O+	0.140E-08	61Mo02	*1)
poly	Run C	0.280E+02	300	O+	0.320E-08	61Mo02	*1)
poly	Run C	0.320E+02	300	O+	0.123E-07	61Mo02	*1)
poly	Run C	0.360E+02	300	O+	0.244E-07	61Mo02	*1)
poly	Run C	0.370E+02	300	O+	0.274E-07	61Mo02	*1)
poly	Run C	0.400E+02	300	O+	0.344E-07	61Mo02	*1)
poly	Run C	0.430E+02	300	O+	0.396E-07	61Mo02	*1)
poly	Run C	0.440E+02	300	O+	0.392E-07	61Mo02	*1)
poly	Run C	0.490E+02	300	O+	0.463E-07	61Mo02	*1)
poly	Run C	0.500E+02	300	O+	0.500E-07	61Mo02	*1)
poly	Run A	0.180E+02	300	O+	0.208E-11	61Mo02	*2)
poly	Run A	0.183E+02	300	O+	0.357E-11	61Mo02	*2)
poly	Run A	0.185E+02	300	O+	0.615E-11	61Mo02	*2)
poly	Run A	0.187E+02	300	O+	0.974E-11	61Mo02	*2)
poly	Run A	0.190E+02	300	O+	0.154E-10	61Mo02	*2)
poly	Run A	0.195E+02	300	O+	0.254E-10	61Mo02	*2)
poly	Run A	0.200E+02	300	O+	0.637E-10	61Mo02	*2)
poly	Run A	0.210E+02	300	O+	0.213E-09	61Mo02	*2)
poly	Run A	0.225E+02	300	O+	0.741E-09	61Mo02	*2)
poly	Run A	0.250E+02	300	O+	0.358E-08	61Mo02	*2)
poly	Run A	0.260E+02	300	O+	0.612E-08	61Mo02	*2)
poly	Run A	0.300E+02	300	O+	0.218E-07	61Mo02	*2)
poly	Run A	0.310E+02	300	O+	0.266E-07	61Mo02	*2)
poly	Run A	0.340E+02	300	O+	0.601E-07	61Mo02	*2)
poly	Run A	0.390E+02	300	O+	0.113E-06	61Mo02	*2)
poly	Run A	0.435E+02	300	O+	0.128E-06	61Mo02	*2)
poly	Run A	0.465E+02	300	O+	0.142E-06	61Mo02	*2)
poly	Run A	0.480E+02	300	O+	0.152E-06	61Mo02	*2)
poly	Run A	0.490E+02	300	O+	0.164E-06	61Mo02	*2)
poly	Run A	0.500E+02	300	O+	0.177E-06	61Mo02	*2)

*1) After O2 had been admitted to burn carbon out of filament.
*2) Befor O2 had been admitted to burn carbon out of filament.

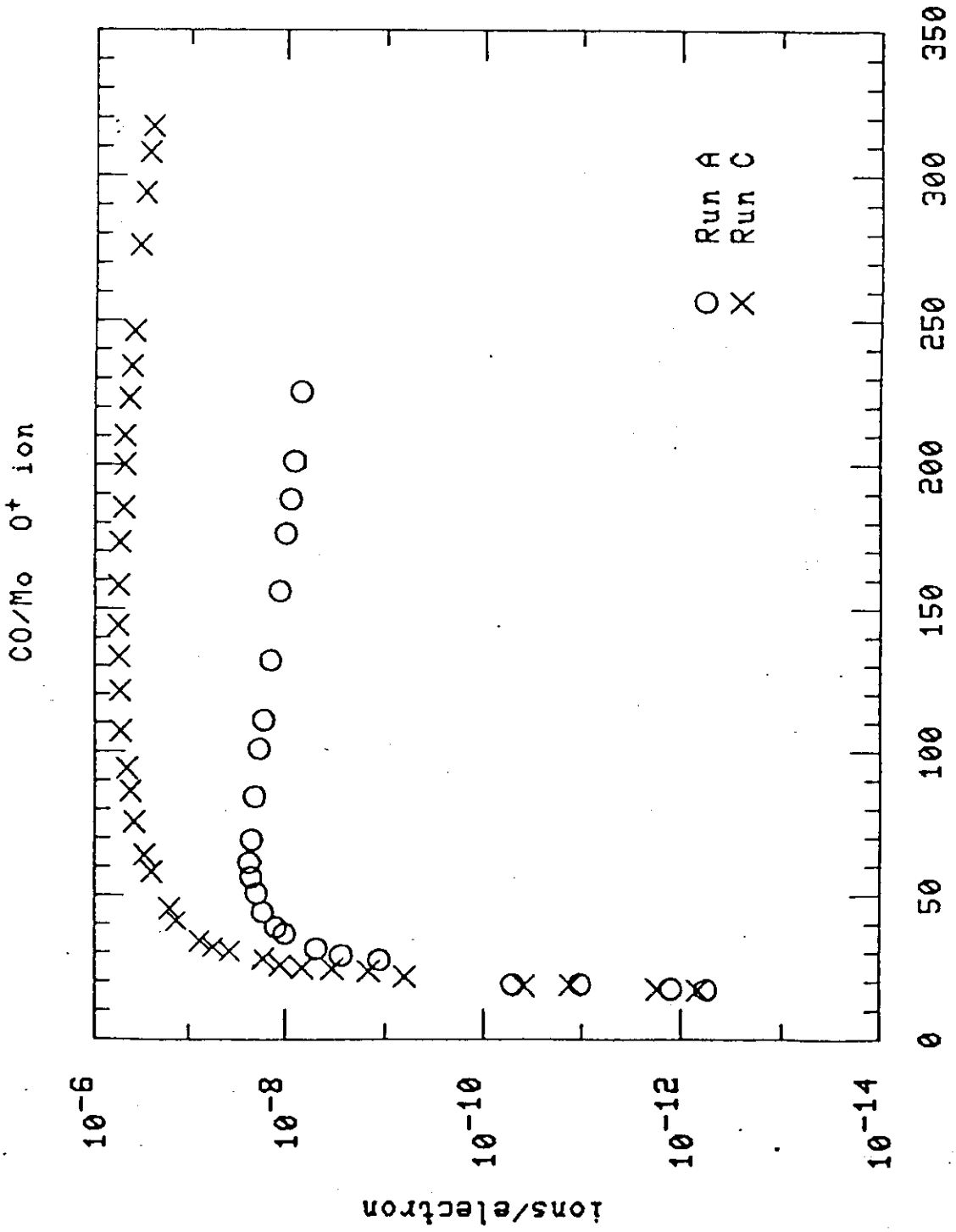

Fig.25 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	Run A	0.170E+02	300	O+	0.571E-12	61Mo02	*1)
poly	Run A	0.190E+02	300	O+	0.104E-10	61Mo02	*1)
poly	Run A	0.200E+02	300	O+	0.512E-10	61Mo02	*1)
poly	Run A	0.215E+02	300	O+	0.108E-09	61Mo02	*1)
poly	Run A	0.240E+02	300	O+	0.334E-09	61Mo02	*1)
poly	Run A	0.275E+02	300	O+	0.114E-08	61Mo02	*1)
poly	Run A	0.290E+02	300	O+	0.274E-08	61Mo02	*1)
poly	Run A	0.315E+02	300	O+	0.482E-08	61Mo02	*1)
poly	Run A	0.390E+02	300	O+	0.124E-07	61Mo02	*1)
poly	Run A	0.440E+02	300	O+	0.169E-07	61Mo02	*1)
poly	Run A	0.510E+02	300	O+	0.196E-07	61Mo02	*1)
poly	Run A	0.615E+02	300	O+	0.234E-07	61Mo02	*1)
poly	Run A	0.690E+02	300	O+	0.221E-07	61Mo02	*1)
poly	Run A	0.845E+02	300	O+	0.208E-07	61Mo02	*1)
poly	Run A	0.100E+03	300	O+	0.187E-07	61Mo02	*1)
poly	Run A	0.130E+03	300	O+	0.142E-07	61Mo02	*1)
poly	Run A	0.155E+03	300	O+	0.115E-07	61Mo02	*1)
poly	Run A	0.175E+03	300	O+	0.998E-08	61Mo02	*1)
poly	Run A	0.200E+03	300	O+	0.824E-08	61Mo02	*1)
poly	Run A	0.225E+03	300	O+	0.698E-08	61Mo02	*1)
poly	Run C	0.165E+02	300	O+	0.683E-12	61Mo02	*2)
poly	Run C	0.190E+02	300	O+	0.949E-10	61Mo02	*2)
poly	Run C	0.200E+02	300	O+	0.239E-09	61Mo02	*2)
poly	Run C	0.240E+02	300	O+	0.337E-08	61Mo02	*2)
poly	Run C	0.280E+02	300	O+	0.170E-07	61Mo02	*2)
poly	Run C	0.300E+02	300	O+	0.386E-07	61Mo02	*2)
poly	Run C	0.340E+02	300	O+	0.792E-07	61Mo02	*2)
poly	Run C	0.355E+02	300	O+	0.108E-06	61Mo02	*2)
poly	Run C	0.460E+02	300	O+	0.162E-06	61Mo02	*2)
poly	Run C	0.530E+02	300	O+	0.219E-06	61Mo02	*2)
poly	Run C	0.580E+02	300	O+	0.249E-06	61Mo02	*2)
poly	Run C	0.860E+02	300	O+	0.421E-06	61Mo02	*2)
poly	Run C	0.940E+02	300	O+	0.464E-06	61Mo02	*2)
poly	Run C	0.120E+03	300	O+	0.548E-06	61Mo02	*2)
poly	Run C	0.160E+03	300	O+	0.566E-06	61Mo02	*2)
poly	Run C	0.185E+03	300	O+	0.504E-06	61Mo02	*2)
poly	Run C	0.200E+03	300	O+	0.487E-06	61Mo02	*2)
poly	Run C	0.210E+03	300	O+	0.485E-06	61Mo02	*2)
poly	Run C	0.295E+03	300	O+	0.308E-06	61Mo02	*2)
poly	Run C	0.320E+03	300	O+	0.255E-06	61Mo02	*2)

*1) Befor O2 had been admitted to burn carbon out of filament.
*2) After O2 had been admitted to burn carbon out of filament.

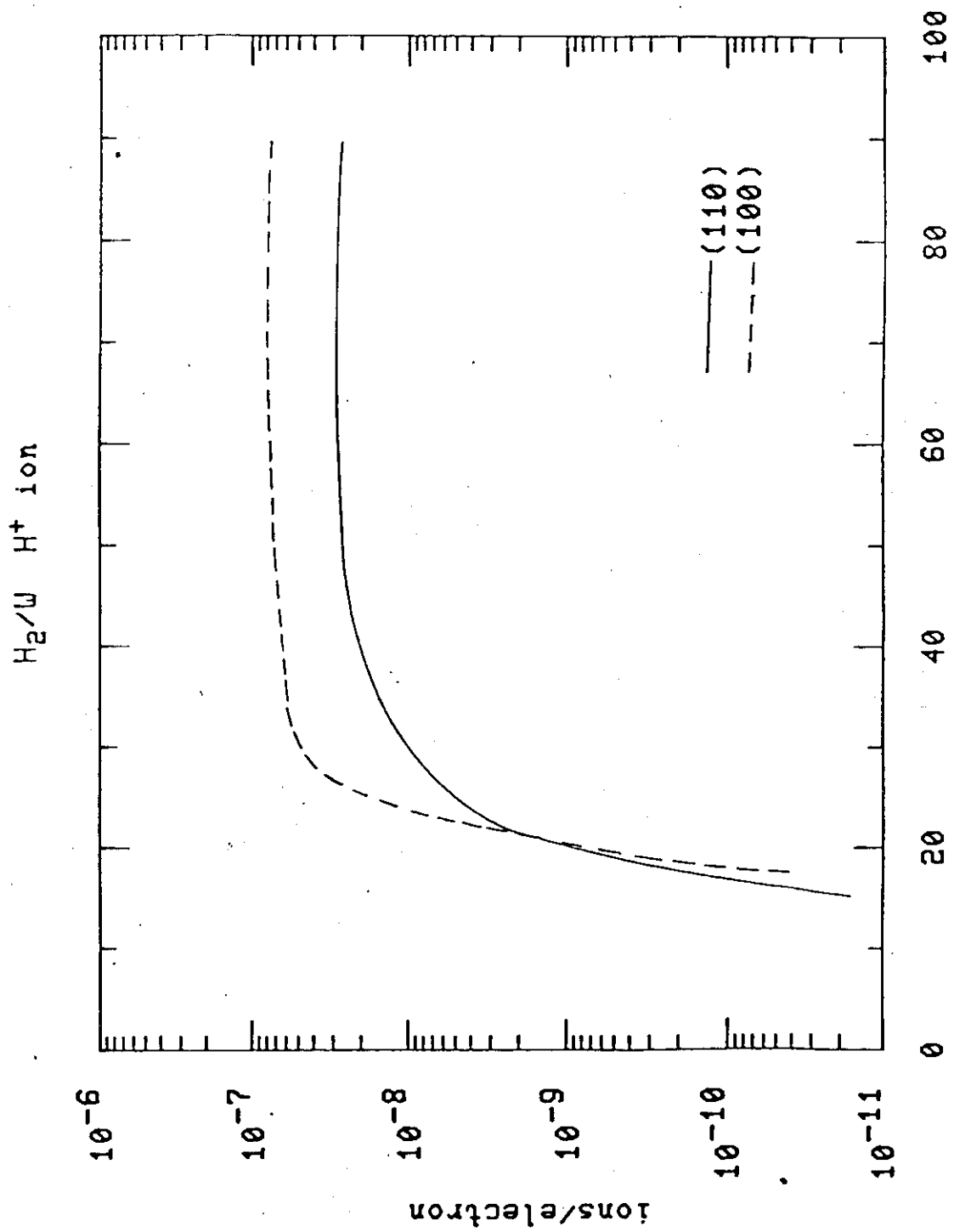

Fig.26 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
110		0.150E+02	300	H+	0.161E-10	77Sa05	*1)
110		0.160E+02	300	H+	0.341E-10	77Sa05	*1)
110		0.170E+02	300	H+	0.105E-09	77Sa05	*1)
110		0.175E+02	300	H+	0.187E-09	77Sa05	*1)
110		0.180E+02	300	H+	0.277E-09	77Sa05	*1)
110		0.190E+02	300	H+	0.600E-09	77Sa05	*1)
110		0.195E+02	300	H+	0.731E-09	77Sa05	*1)
110		0.200E+02	300	H+	0.946E-09	77Sa05	*1)
110		0.230E+02	300	H+	0.310E-08	77Sa05	*1)
110		0.250E+02	300	H+	0.529E-08	77Sa05	*1)
110		0.280E+02	300	H+	0.834E-08	77Sa05	*1)
110		0.295E+02	300	H+	0.104E-07	77Sa05	*1)
110		0.345E+02	300	H+	0.157E-07	77Sa05	*1)
110		0.380E+02	300	H+	0.188E-07	77Sa05	*1)
110		0.440E+02	300	H+	0.234E-07	77Sa05	*1)
110		0.550E+02	300	H+	0.274E-07	77Sa05	*1)
110		0.670E+02	300	H+	0.286E-07	77Sa05	*1)
110		0.730E+02	300	H+	0.292E-07	77Sa05	*1)
110		0.810E+02	300	H+	0.280E-07	77Sa05	*1)
110		0.885E+02	300	H+	0.270E-07	77Sa05	*1)
100		0.170E+02	300	H+	0.468E-10	77Sa05	*1)
100		0.180E+02	300	H+	0.898E-10	77Sa05	*1)
100		0.185E+02	300	H+	0.190E-09	77Sa05	*1)
100		0.195E+02	300	H+	0.300E-09	77Sa05	*1)
100		0.200E+02	300	H+	0.544E-09	77Sa05	*1)
100		0.210E+02	300	H+	0.168E-08	77Sa05	*1)
100		0.220E+02	300	H+	0.385E-08	77Sa05	*1)
100		0.240E+02	300	H+	0.145E-07	77Sa05	*1)
100		0.260E+02	300	H+	0.233E-07	77Sa05	*1)
100		0.310E+02	300	H+	0.516E-07	77Sa05	*1)
100		0.350E+02	300	H+	0.616E-07	77Sa05	*1)
100		0.430E+02	300	H+	0.709E-07	77Sa05	*1)
100		0.480E+02	300	H+	0.724E-07	77Sa05	*1)
100		0.530E+02	300	H+	0.753E-07	77Sa05	*1)
100		0.600E+02	300	H+	0.785E-07	77Sa05	*1)
100		0.680E+02	300	H+	0.801E-07	77Sa05	*1)
100		0.750E+02	300	H+	0.802E-07	77Sa05	*1)
100		0.800E+02	300	H+	0.819E-07	77Sa05	*1)
100		0.850E+02	300	H+	0.803E-07	77Sa05	*1)
100		0.890E+02	300	H+	0.788E-07	77Sa05	*1)

*1) QMS on Axis

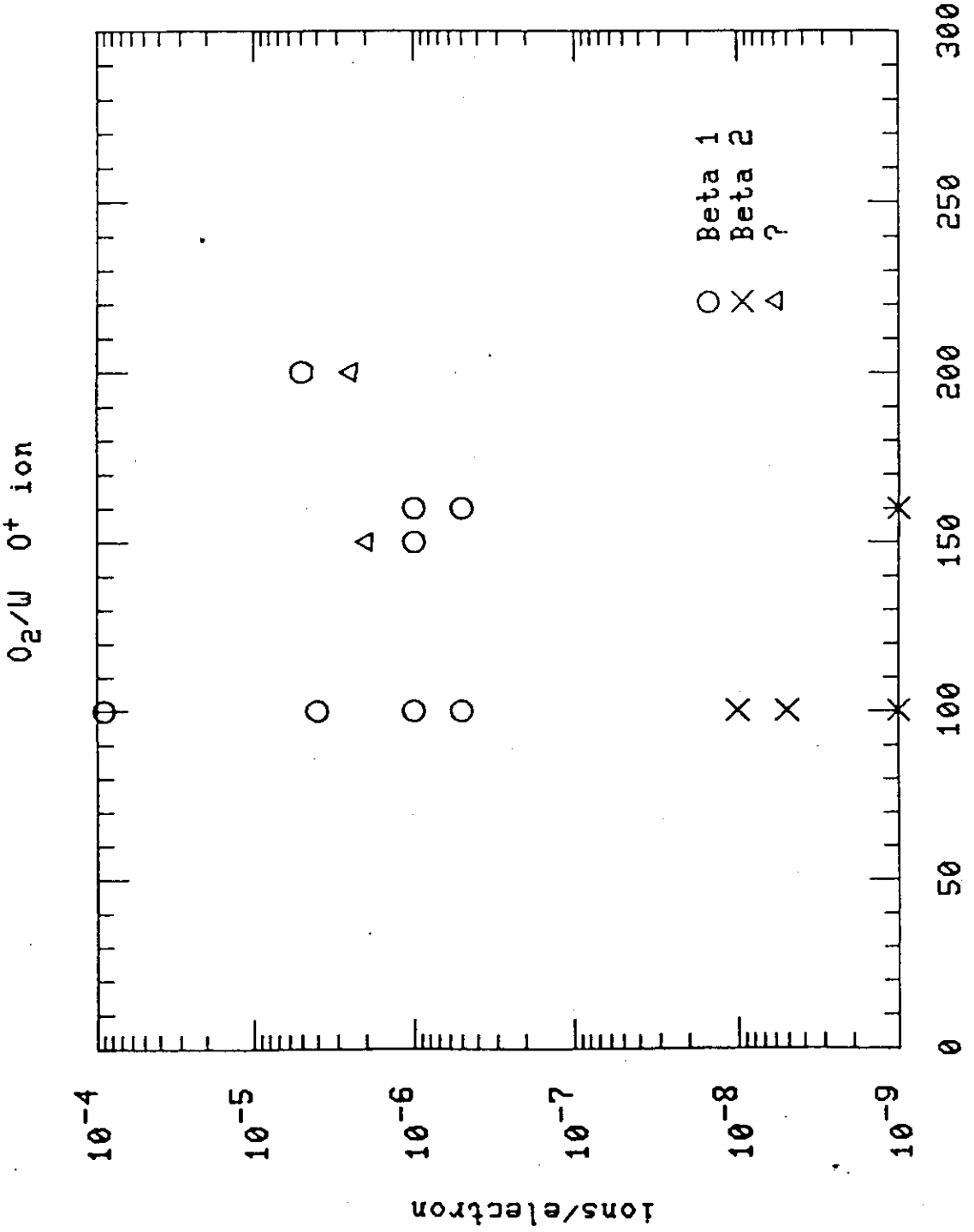

Fig.27 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
100	Beta 1	0.100E+03	300	O+	0.400E-05	76Ag06	0.1 L
poly	Beta 1	0.100E+03	?	O+	0.500E-06	76Fl01	
100	Beta 1	0.100E+03	<100	O+	0.100E-05	75Ma12	*1)
poly	Beta 1	0.100E+03	300	O+	0.900E-04	70Ni03	*2)
poly	Beta 1	0.150E+03	430	O+	0.100E-05	70Kl02	
100	Beta 1	0.160E+03	300	O+	0.100E-05	78Pr02	
poly	Beta 1	0.160E+03	300	O+	0.500E-06	76Fl01	
110	Beta 1	0.200E+03	300	O+	0.500E-05	74As01	2000 L
?	Beta 2	0.100E+03	?	O+	0.100E-07	76Ag06	0.1 L
100	Beta 2	0.100E+03	300	O+	0.500E-08	72Ma08	
100	Beta 2	0.100E+03	<100	O+	0.500E-08	75Ma12	*1)
poly	Beta 2	0.100E+03	300	O+	0.100E-08	78Pr01	
100	Beta 2	0.160E+03	300	O+	0.100E-08	78Pr02	*1)
poly	?	0.150E+03	430	O+	0.200E-05	70Kl02	
100	?	0.200E+03	?	O+	0.250E-05	72As02	

*1) incident angle 45

*2) incident angle 38 , QMS

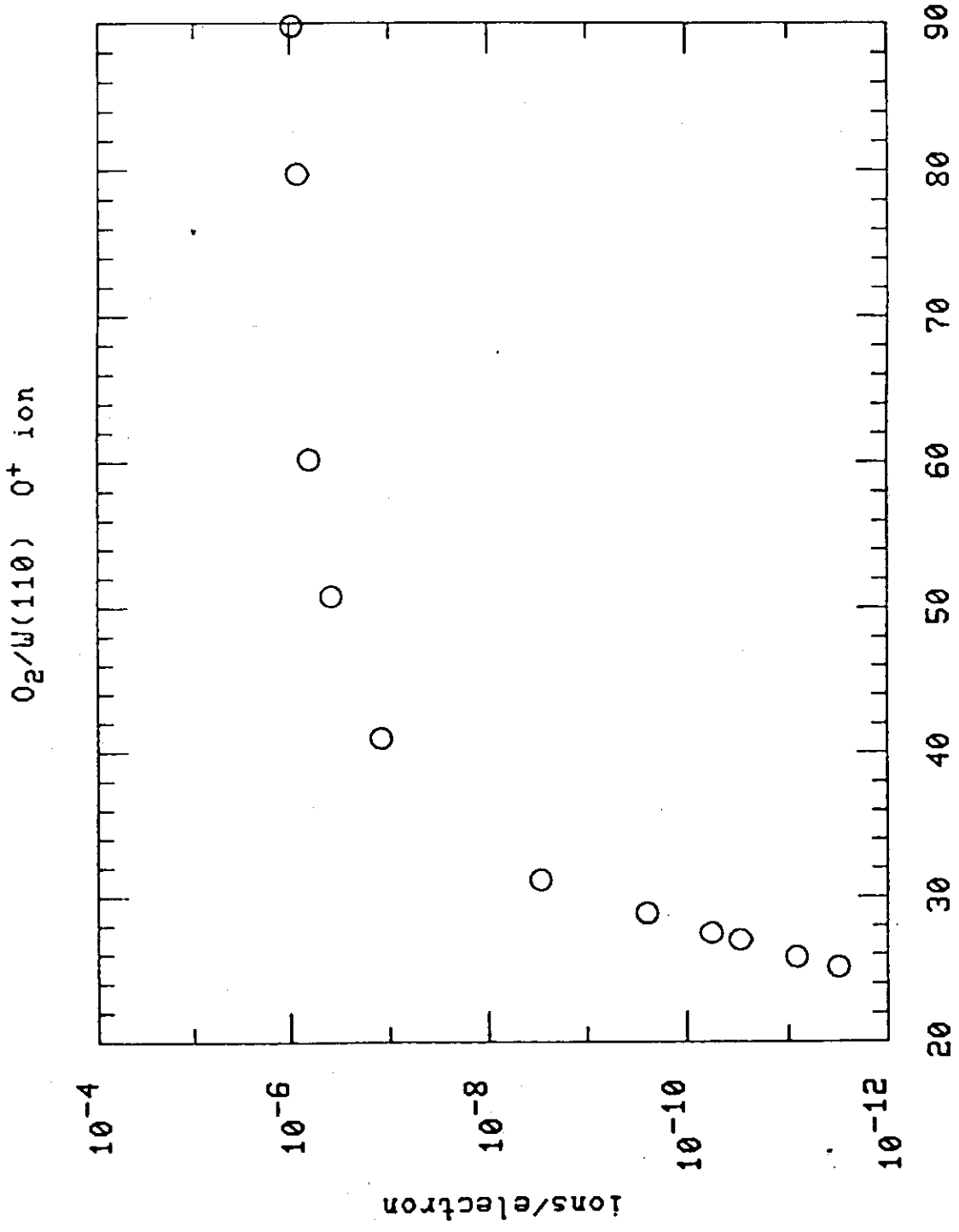

Fig.28 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
110		o.250E+02	300	O+	0.315E-11	77Sa05	QMS
110		0.260E+02	300	O+	0.821E-11	77Sa05	QMS
110		0.270E+02	300	O+	0.301E-10	77Sa05	QMS
110		0.280E+02	300	O+	0.576E-10	77Sa05	QMS
110		0.290E+02	300	O+	0.247E-09	77Sa05	QMS
110		0.310E+02	300	O+	0.293E-08	77Sa05	QMS
110		0.410E+02	300	O+	0.122E-06	77Sa05	QMS
110		0.510E+02	300	O+	0.378E-06	77Sa05	QMS
110		0.600E+02	300	O+	0.632E-06	77Sa05	QMS
110		0.800E+02	300	O+	0.842E-06	77Sa05	QMS
110		0.900E+02	300	O+	0.944E-06	77Sa05	QMS

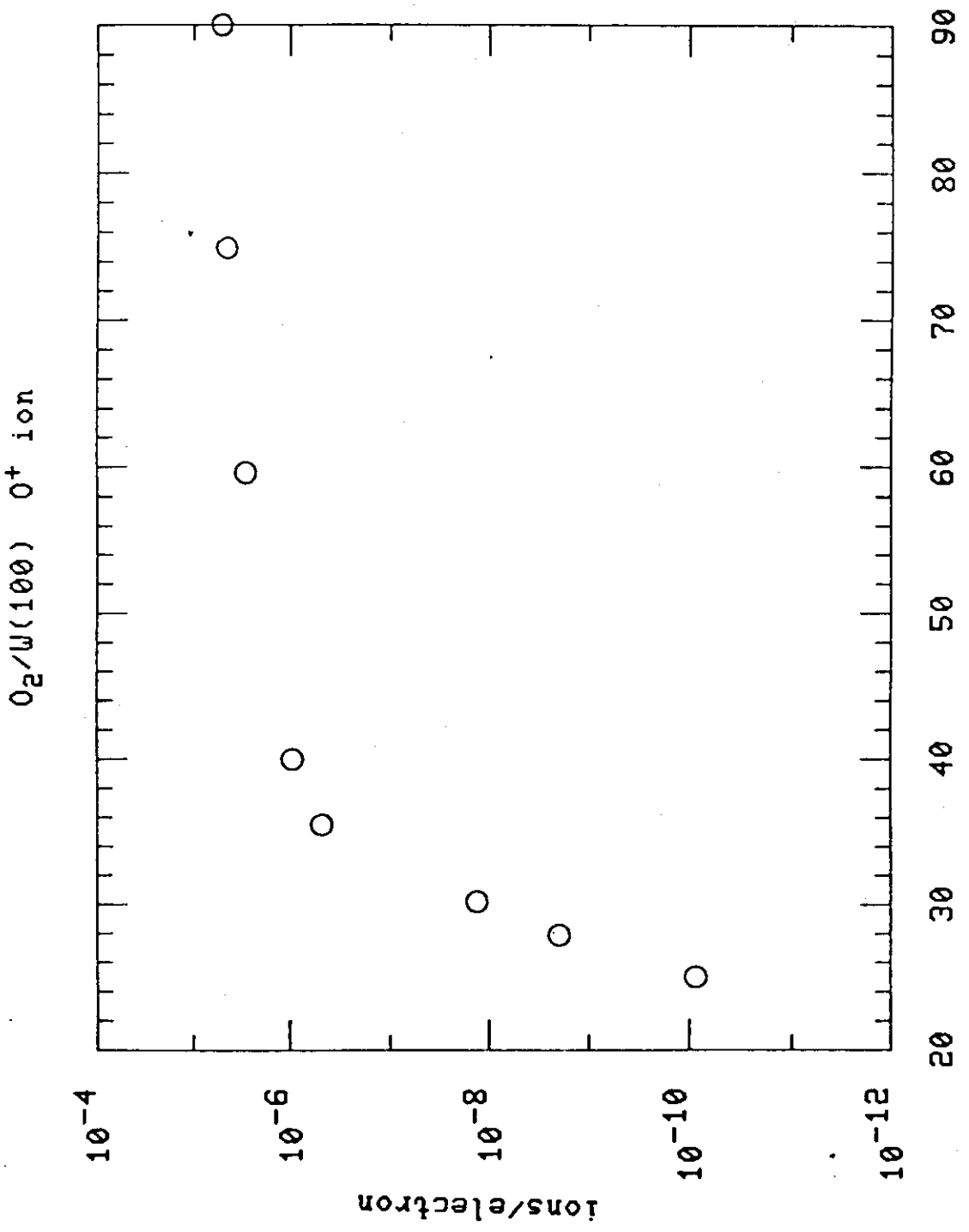

Fig.29 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
100		0.250E+02	?	O+	0.868E-10	77Sa05	*1)
100		0.279E+02	?	O+	0.197E-08	77Sa05	*1)
100		0.302E+02	?	O+	0.132E-07	77Sa05	*1)
100		0.355E+02	?	O+	0.475E-06	77Sa05	*1)
100		0.400E+02	?	O+	0.944E-06	77Sa05	*1)
100		0.596E+02	?	O+	0.284E-05	77Sa05	*1)
100		0.749E+02	?	O+	0.456E-05	77Sa05	*1)
100		0.900E+02	?	O+	0.505E-05	77Sa05	*1)

*1) TOF method

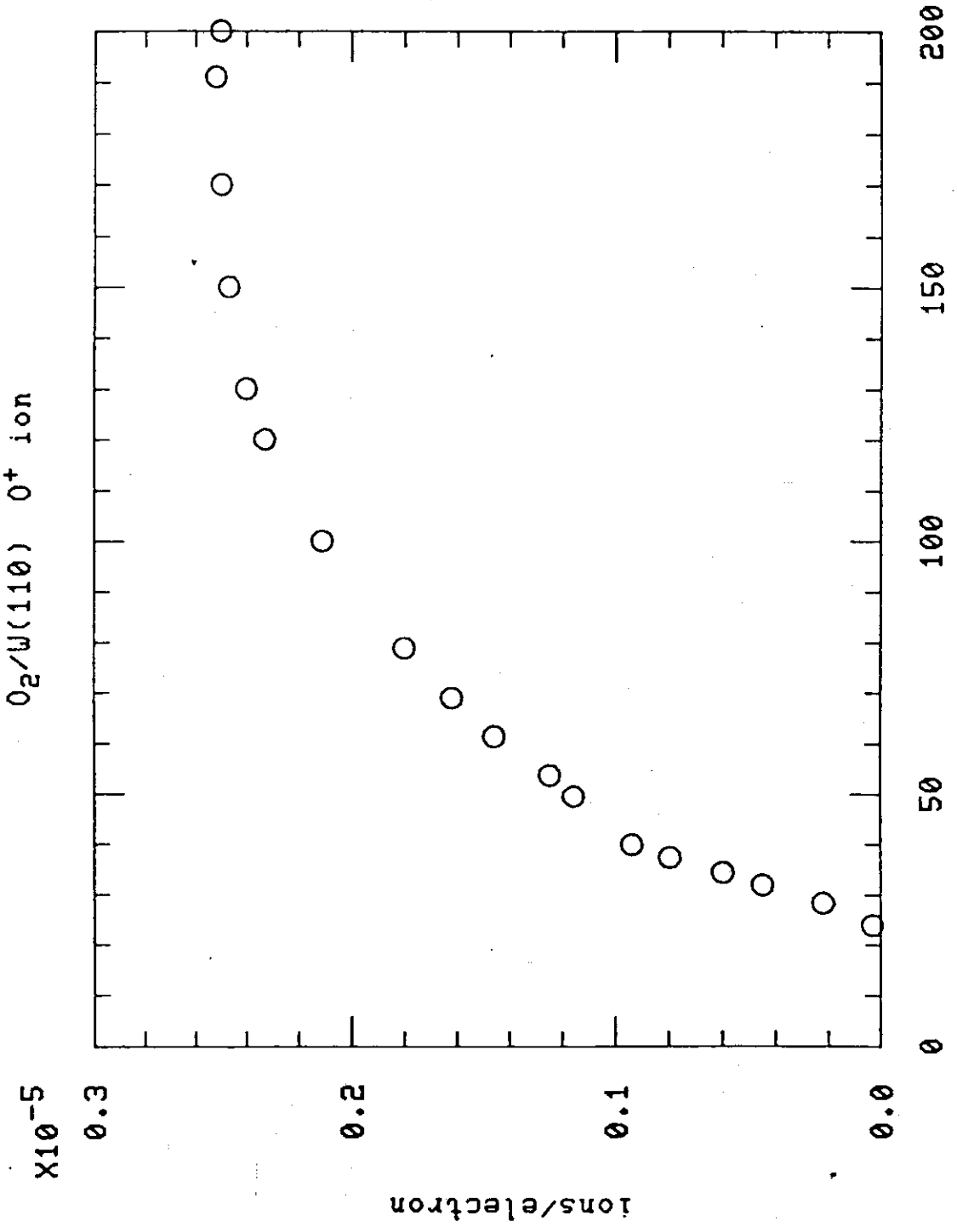

Fig.30 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
110	Beta 1	0.240E+02	300	O+	0.329E-07	72As02	
110	Beta 1	0.284E+02	300	O+	0.222E-06	72As02	
110	Beta 1	0.319E+02	300	O+	0.450E-06	72As02	
110	Beta 1	0.344E+02	300	O+	0.599E-06	72As02	
110	Beta 1	0.374E+02	300	O+	0.796E-06	72As02	
110	Beta 1	0.399E+02	300	O+	0.938E-06	72As02	
110	Beta 1	0.495E+02	300	O+	0.116E-05	72As02	
110	Beta 1	0.537E+02	300	O+	0.125E-05	72As02	
110	Beta 1	0.614E+02	300	O+	0.146E-05	72As02	
110	Beta 1	0.690E+02	300	O+	0.162E-05	72As02	
110	Beta 1	0.789E+02	300	O+	0.180E-05	72As02	
110	Beta 1	0.100E+03	300	O+	0.211E-05	72As02	
110	Beta 1	0.120E+03	300	O+	0.233E-05	72As02	
110	Beta 1	0.130E+03	300	O+	0.240E-05	72As02	
110	Beta 1	0.150E+03	300	O+	0.247E-05	72As02	
110	Beta 1	0.170E+03	300	O+	0.250E-05	72As02	
110	Beta 1	0.191E+03	300	O+	0.252E-05	72As02	
110	Beta 1	0.200E+03	300	O+	0.250E-05	72As02	

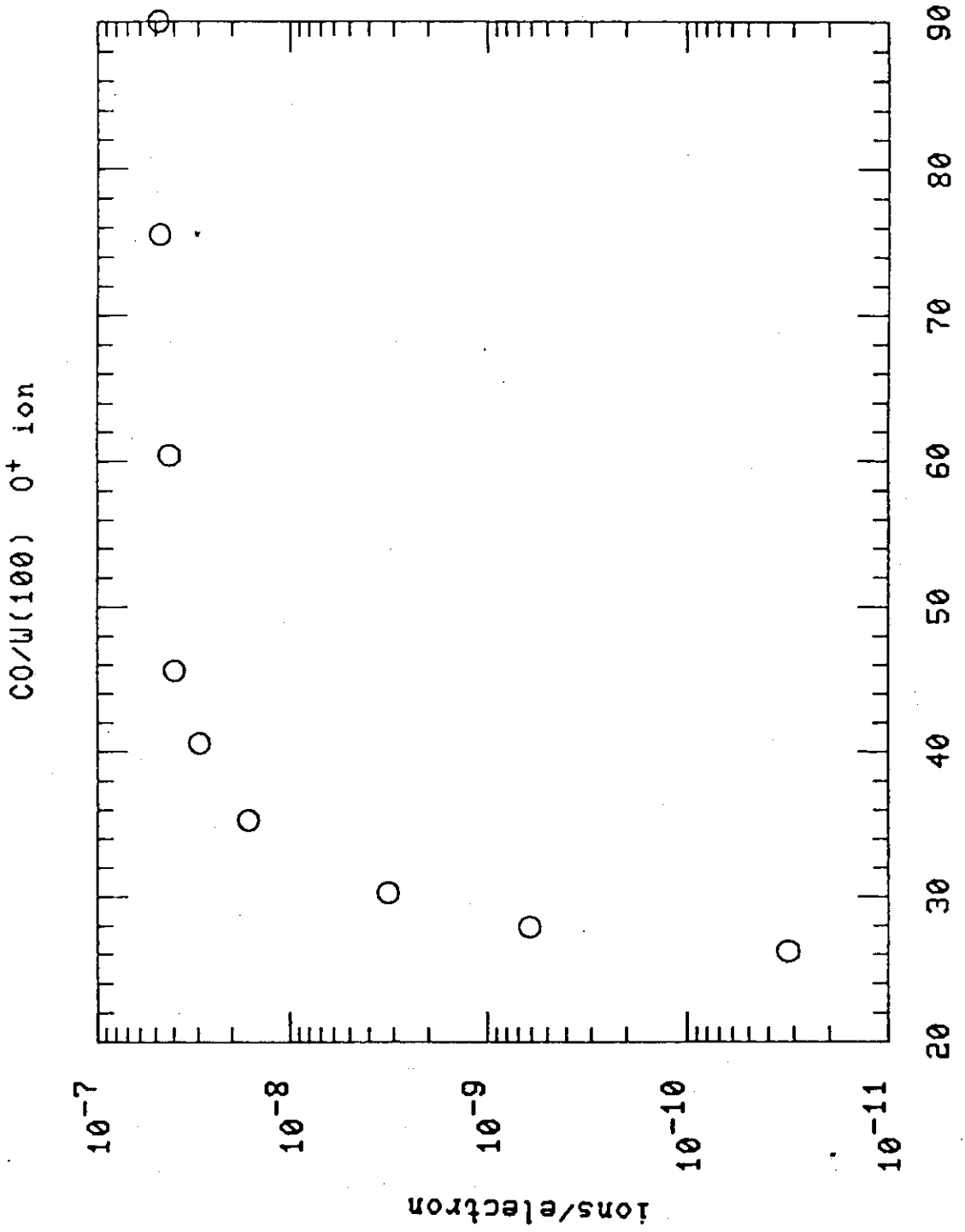

Fig.31 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
100		0.262E+02	300	O+	0.321E-10	77Sa05	QMS
100		0.279E+02	300	O+	0.610E-09	77Sa05	QMS
100		0.303E+02	300	O+	0.319E-08	77Sa05	QMS
100		0.353E+02	300	O+	0.164E-07	77Sa05	QMS
100		0.406E+02	300	O+	0.295E-07	77Sa05	QMS
100		0.456E+02	300	O+	0.397E-07	77Sa05	QMS
100		0.604E+02	300	O+	0.423E-07	77Sa05	QMS
100		0.755E+02	300	O+	0.473E-07	77Sa05	QMS
100		0.900E+02	300	O+	0.480E-07	77Sa05	QMS

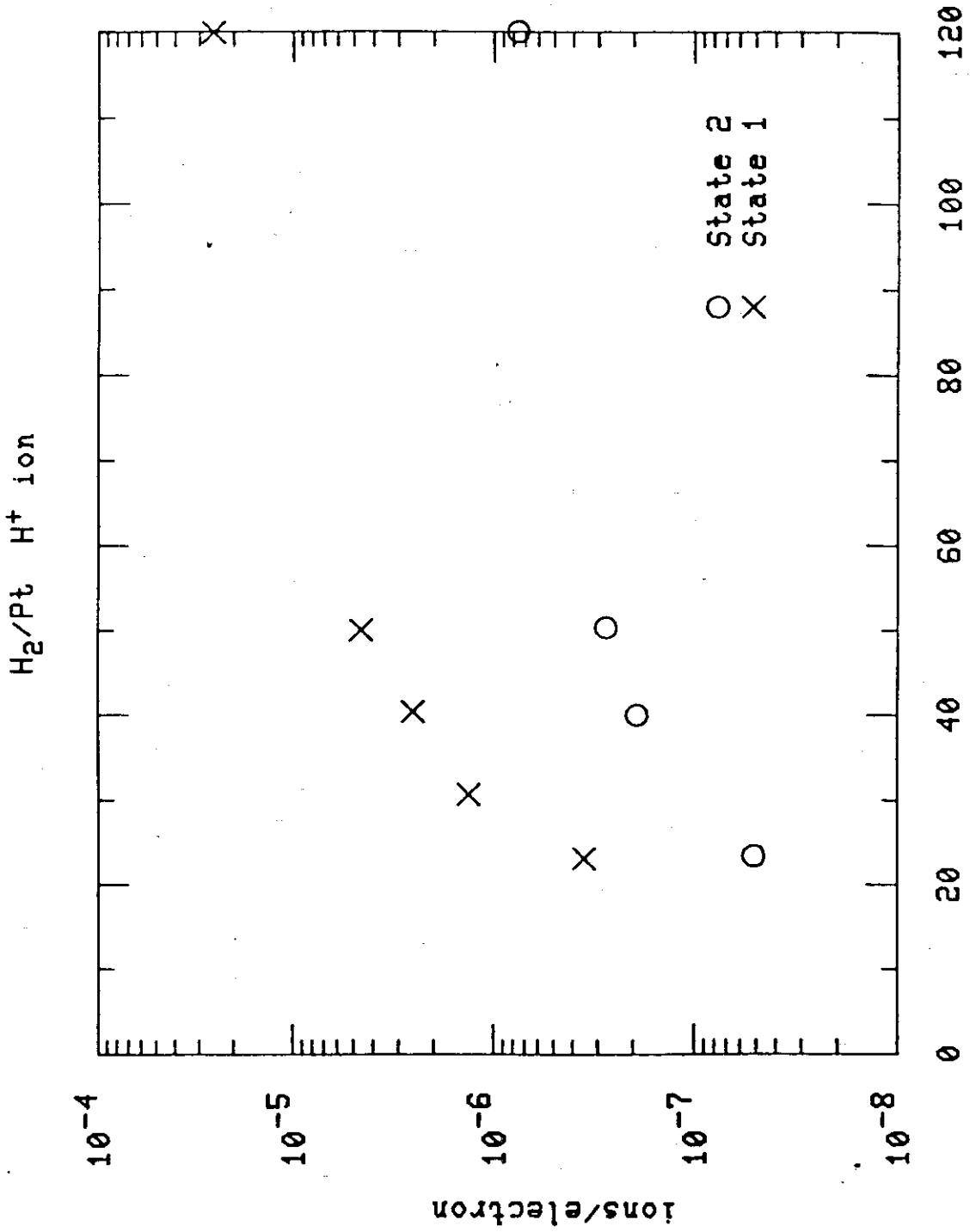

Fig.32 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	State 2	0.234E+02	70	H+	0.515E-07	70Hu03	*1)
poly	State 2	0.400E+02	70	H+	0.191E-06	70Hu03	*1)
poly	State 2	0.503E+02	70	H+	0.272E-06	70Hu03	*1)
poly	State 2	0.120E+03	70	H+	0.756E-06	70Hu03	*1)
poly	State 1	0.230E+02	70	H+	0.352E-06	70Hu03	*2)
poly	State 1	0.306E+02	70	H+	0.134E-05	70Hu03	*2)
poly	State 1	0.403E+02	70	H+	0.254E-05	70Hu03	*2)
poly	State 1	0.500E+02	70	H+	0.458E-05	70Hu03	*2)
poly	State 1	0.120E+03	70	H+	0.258E-04	70Hu03	*2)

*1) unsaturated level [The coverage is about 0.1% of the saturated coverage]
*2) saturated level

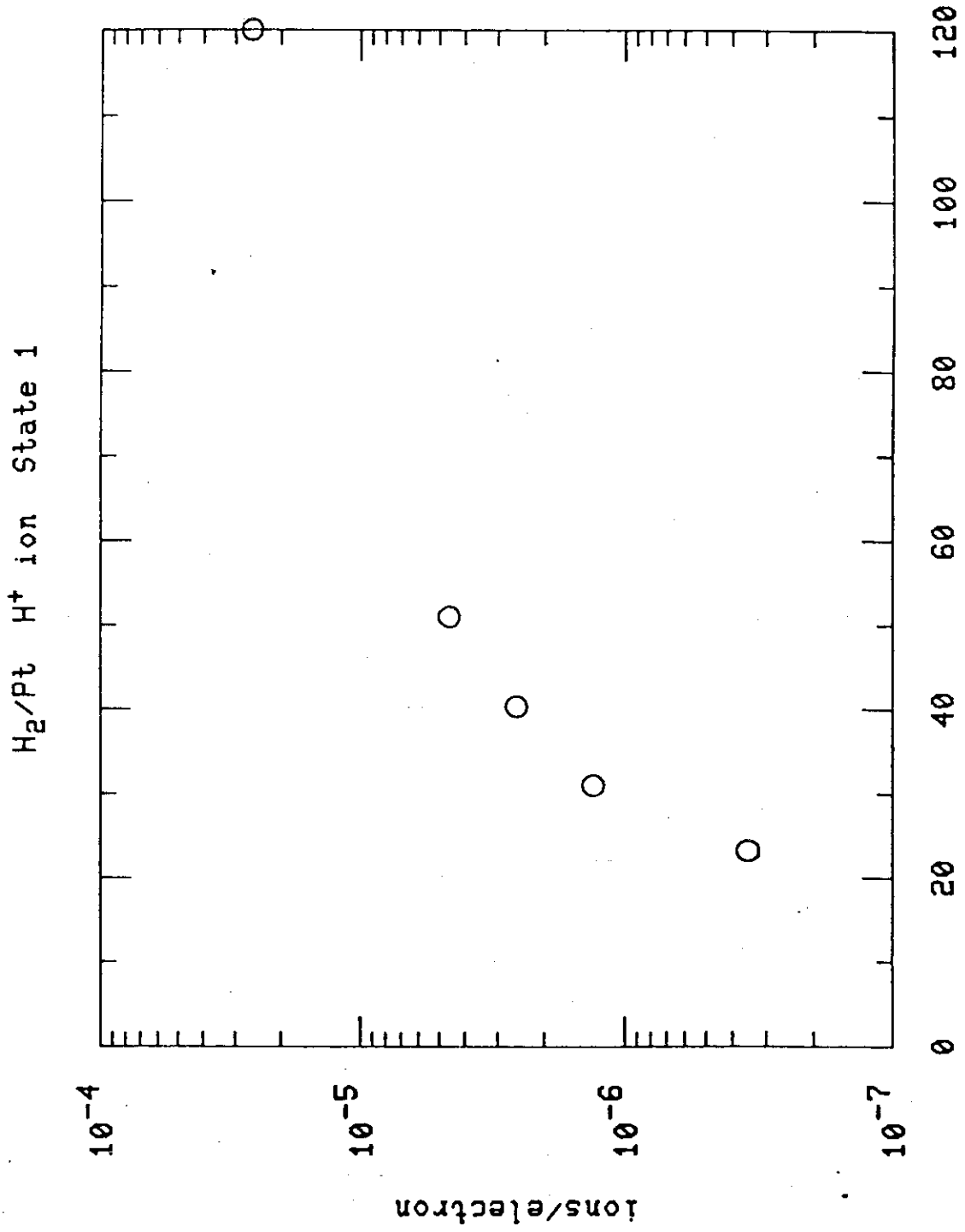

Fig.33 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	State 1	0.232E+02	70	H+	0.352E-06	70Hu03	*1)
poly	State 1	0.310E+02	70	H+	0.131E-05	70Hu03	*1)
poly	State 1	0.403E+02	70	H+	0.254E-05	70Hu03	*1)
poly	State 1	0.510E+02	70	H+	0.458E-05	70Hu03	*1)
poly	State 1	0.120E+03	70	H+	0.258E-04	70Hu03	*1)

*1) saturated level

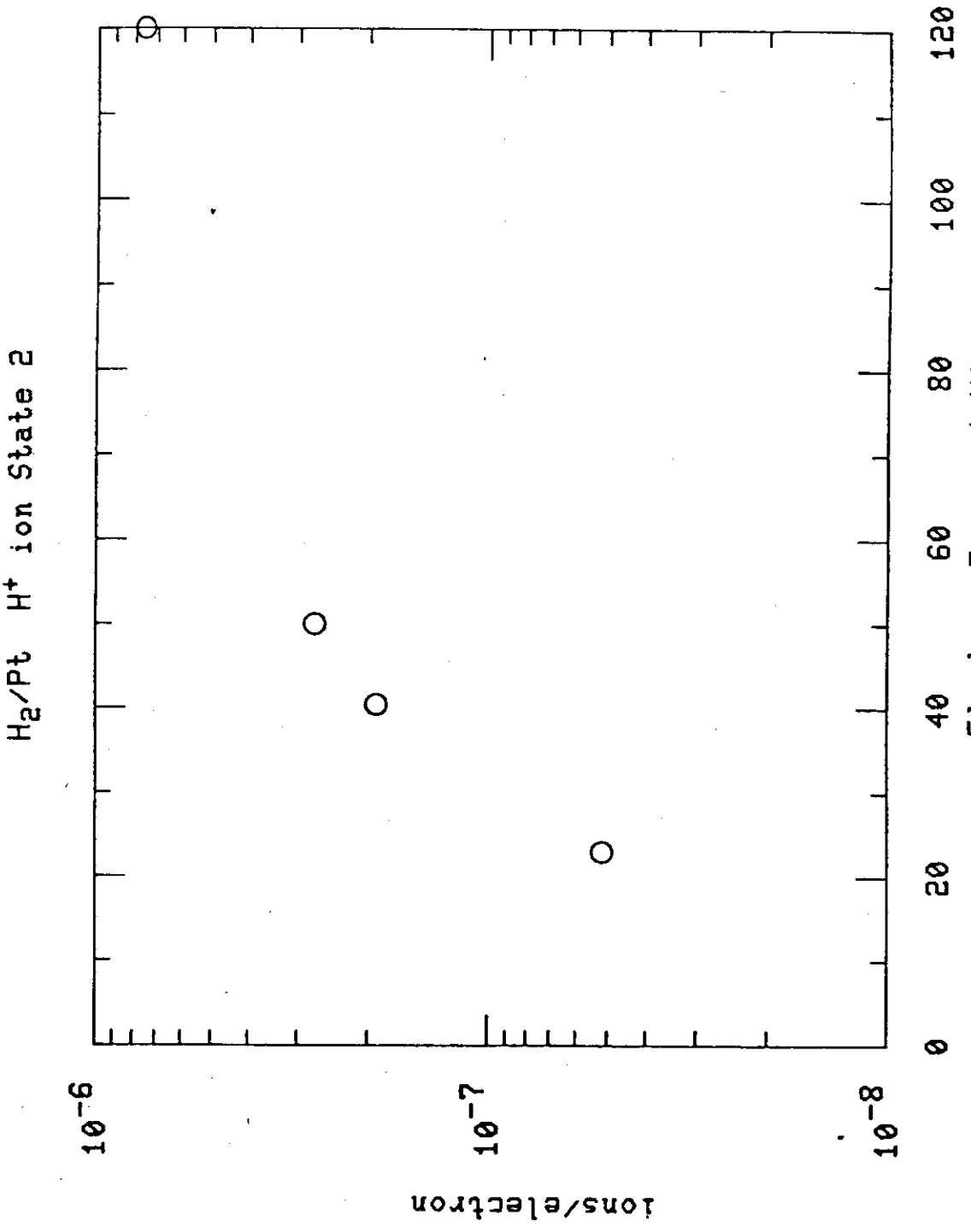

Fig.34 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly	State 2	0.230E+02	70	H+	0.514E-07	70Hu03	*1)
poly	State 2	0.404E+02	70	H+	0.191E-06	70Hu03	*1)
poly	State 2	0.500E+02	70	H+	0.272E-06	70Hu03	*1)
poly	State 2	0.120E+03	70	H+	0.756E-06	70Hu03	*1)

*1) unsaturated level

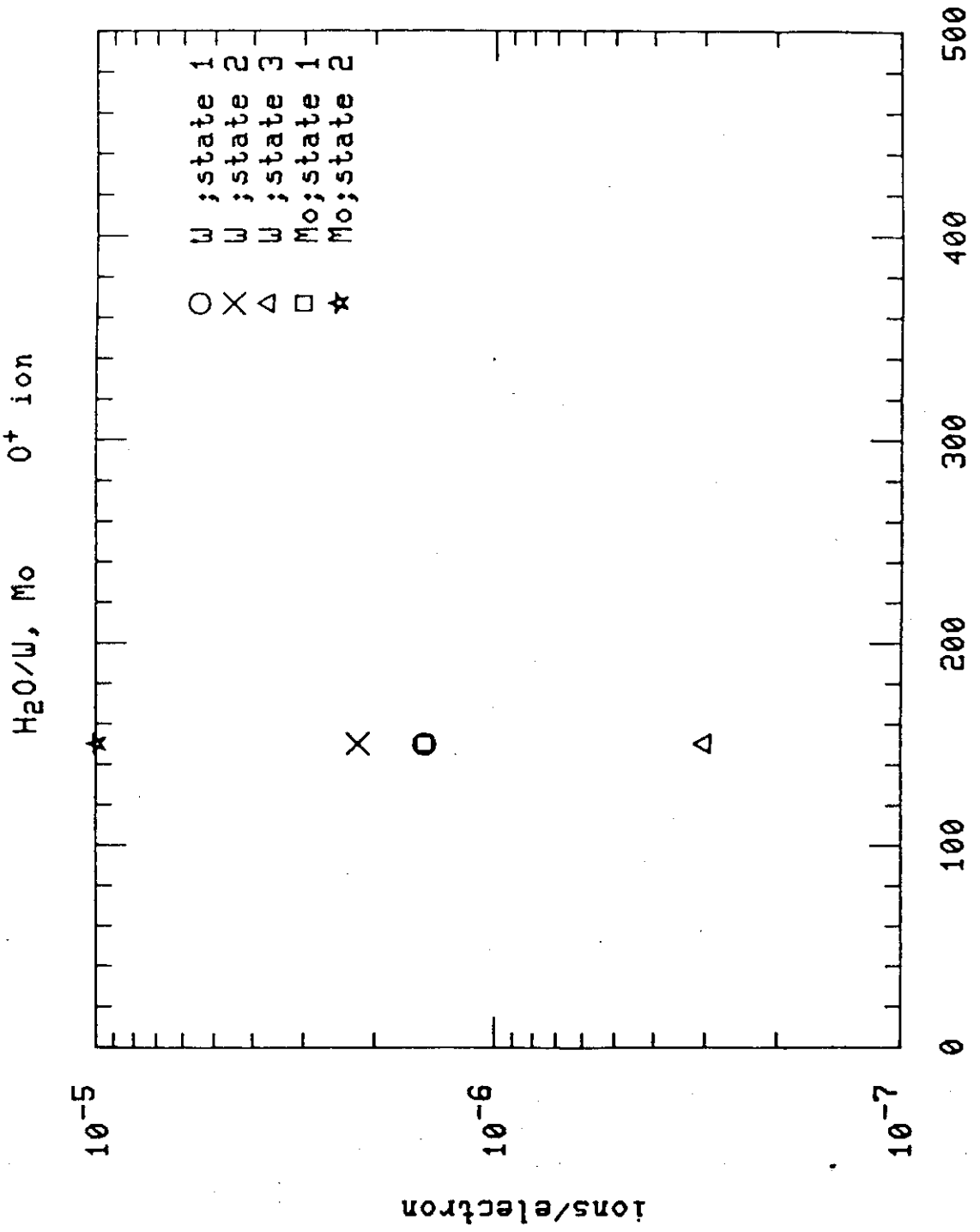

Fig.35 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
W poly	W ; I	0.150E+03	430	O+	0.150E-05	70K103	
W poly	W ; II	0.150E+03	430	O+	0.220E-05	70K103	
W poly	W ; III	0.150E+03	430	O+	0.300E-06	70K103	
Mo poly	Mo; I	0.150E+03	420	O+	0.150E-05	70K105	
Mo poly	Mo; II	0.150E+03	420	O+	0.100E-04	70K105	

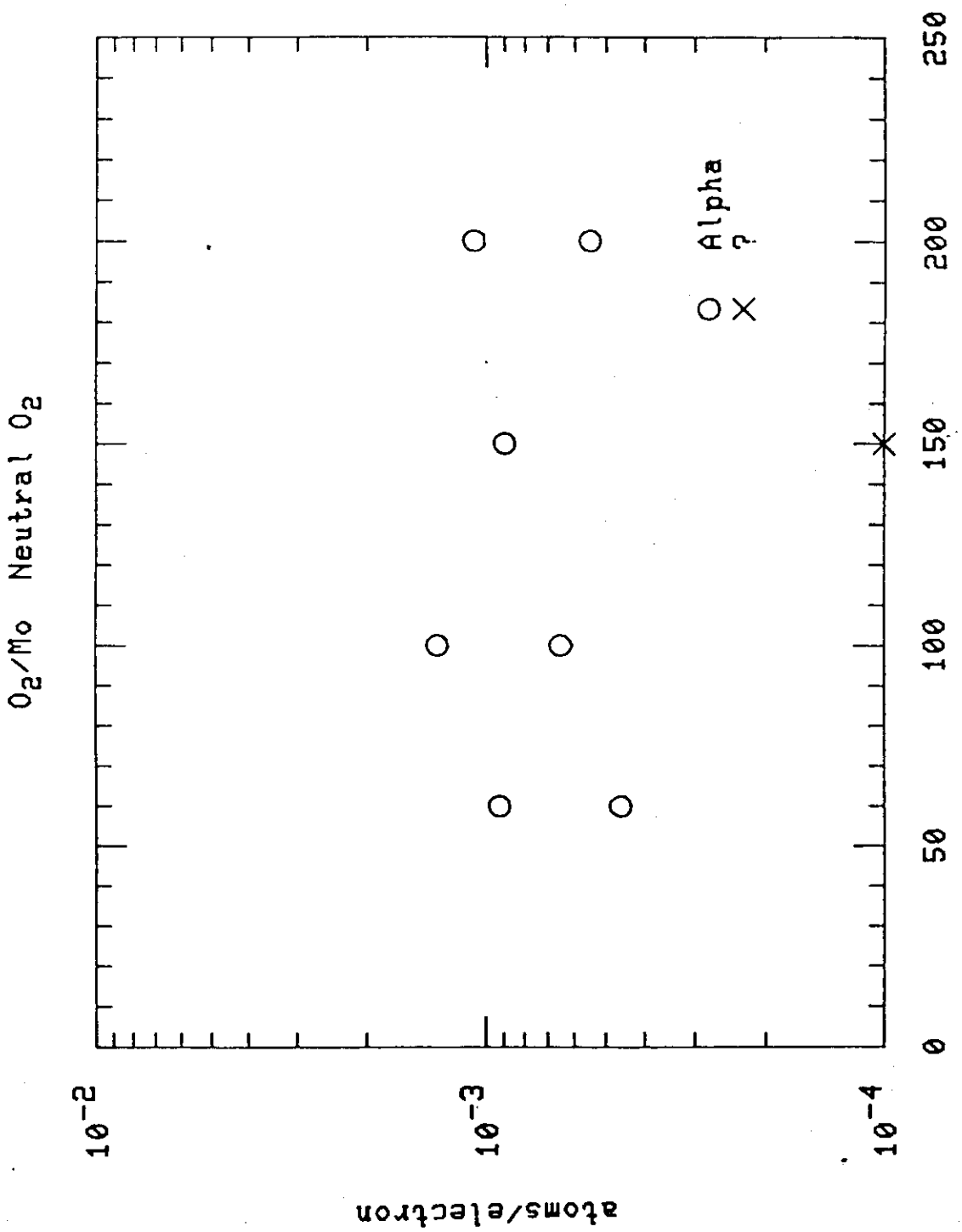

Fig.36 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Atoms per electron	Ref.	Remark
poly	Alpha	0.600E+02	300	O2	0.460E-03	64Re03	*1)
poly	Alpha	0.600E+02	300	O2	0.925E-03	63Re01	*2)
poly	Alpha	0.100E+03	300	O2	0.650E-03	64Re03	*1)
poly	Alpha	0.100E+03	300	O2	0.133E-02	64Re01	*2)
poly	Alpha	0.150E+03	420	O2	0.900E-03	70K105	*1)
poly	Alpha	0.200E+03	300	O2	0.550E-03	64Re03	
poly	Alpha	0.200E+03	300	O2	0.108E-02	64Re03	
poly	?	0.150E+03	420	O2	0.100E-03	70K105	

*1) 5E+14 atoms/cm**2
*2) 1E+15 atoms/cm**2

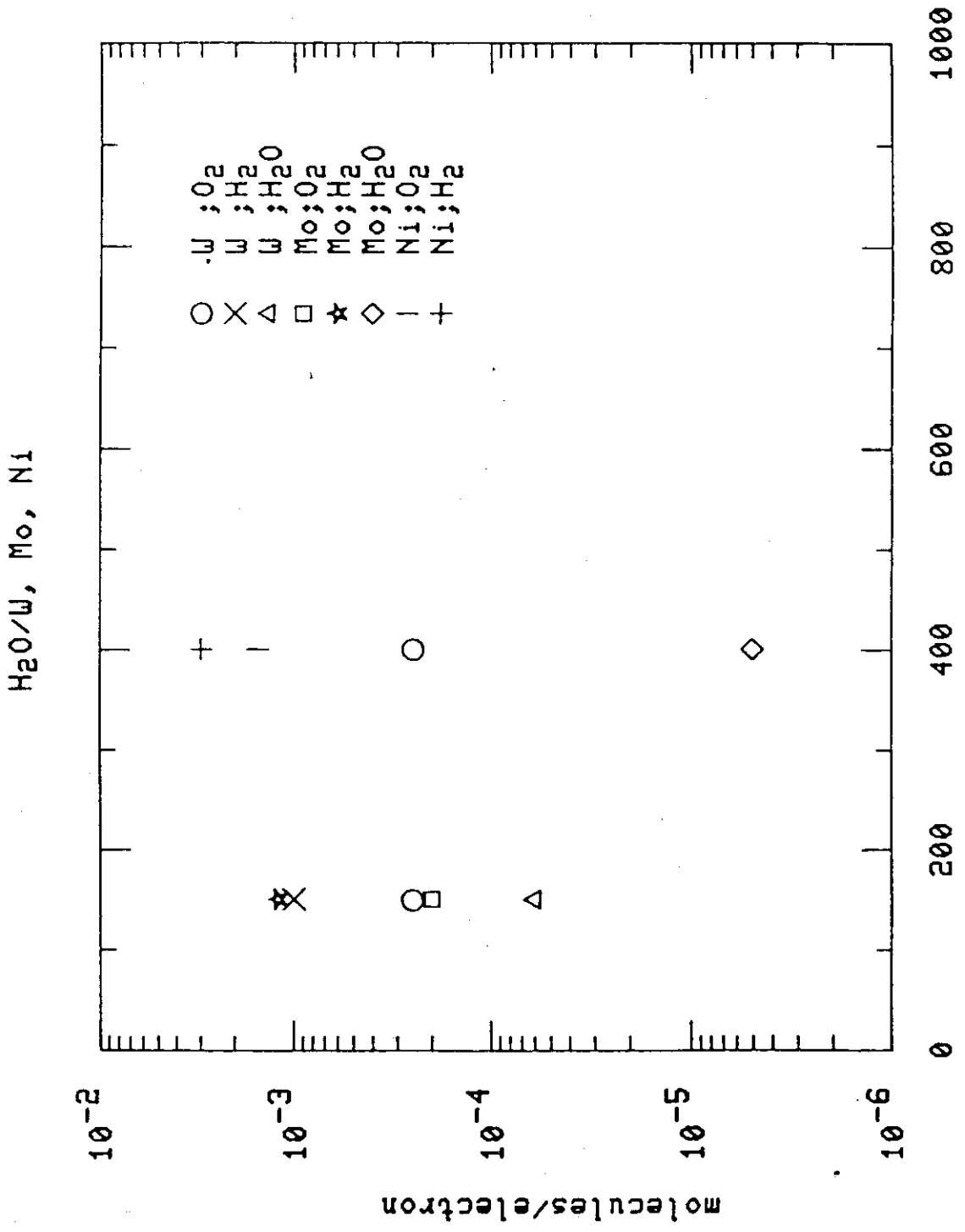

Fig.37 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Molecules per electron	Ref.	Remark
W poly	I	0.150E+03	430	O2	0.250E-03	70K103	
W poly	?	0.400E+03	473	O2	0.250E-03	67K101	
W poly	I	0.150E+03	430	H2	0.100E-02	70K103	
W poly	I	0.150E+03	430	H2O	0.600E-04	70K103	
Mo poly	I	0.150E+03	420	O2	0.200E-03	70K105	
Mo poly	I	0.150E+03	420	H2	0.120E-02	70K105	
Mo poly	I	0.400E+03	420	H2O	0.500E-05	70K105	
Ni poly	?	0.400E+03	473	O2	0.155E-02	67K101	
Ni poly	?	0.400E+03	473	H2	0.300E-02	67K101	

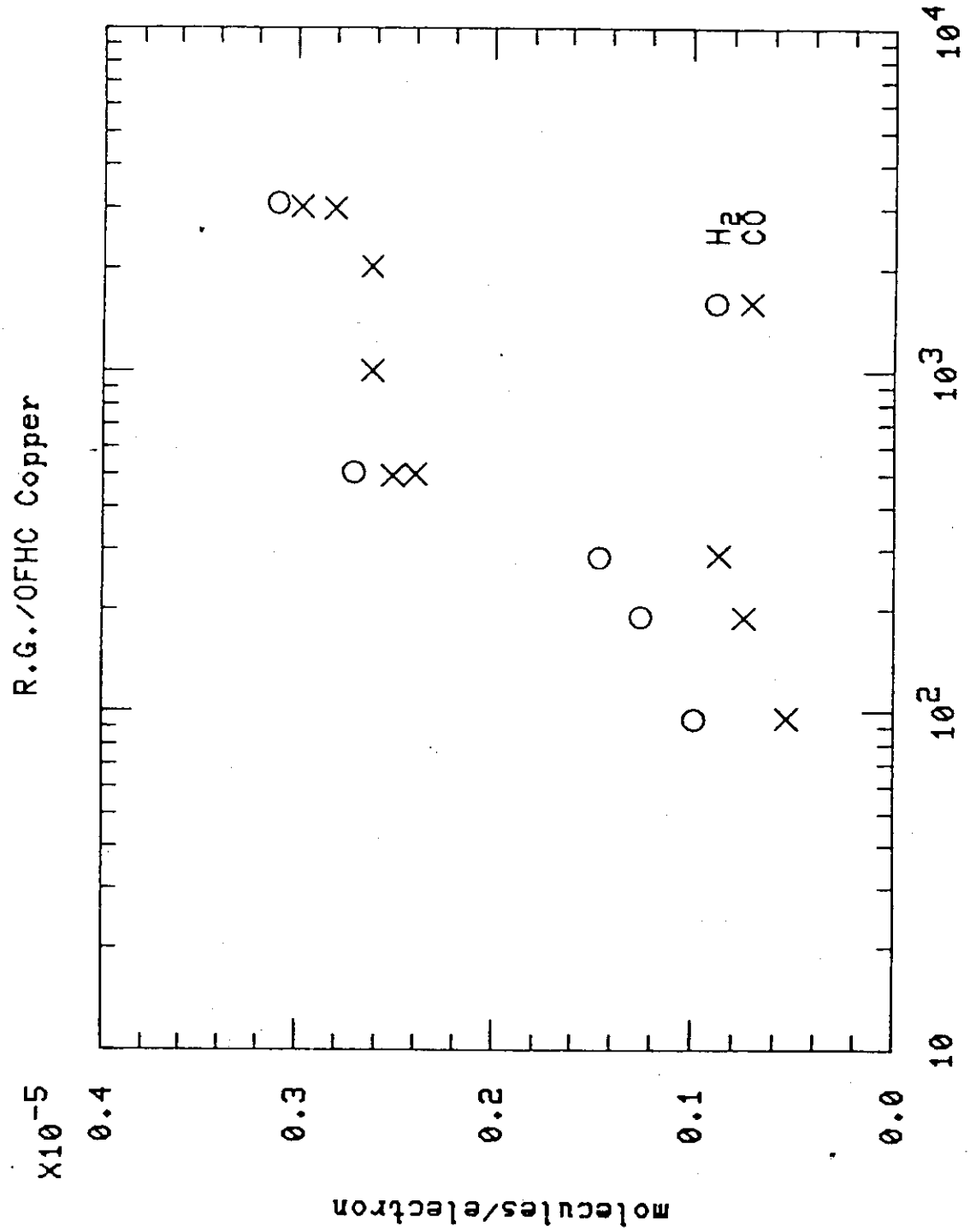

Fig.38 Desorption efficiency as a function of incident energy

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Molecules per electron	Ref.	Remark
poly		0.947E+02	300	H2	0.989E-06	65Fi03	*1)
poly		0.190E+03	300	H2	0.125E-05	65Fi03	*1)
poly		0.284E+03	300	H2	0.146E-05	65Fi03	*1)
poly		0.503E+03	300	H2	0.271E-05	65Fi03	*1)
poly		0.308E+04	300	H2	0.310E-05	65Fi03	*1)
poly		0.492E+03	300	CO	0.252E-05	65Fi03	*1)
poly		0.100E+04	300	CO	0.262E-05	65Fi03	*1)
poly		0.202E+04	300	CO	0.263E-05	65Fi03	*1)
poly		0.298E+04	300	CO	0.281E-05	65Fi03	*1)
poly		0.950E+02	300	CO	0.537E-06	65Fi03	*1)
poly		0.189E+03	300	CO	0.748E-06	65Fi03	*1)
poly		0.288E+03	300	CO	0.871E-06	65Fi03	*1)
poly		0.498E+03	300	CO	0.240E-05	65Fi03	*1)
poly		0.301E+04	300	CO	0.298E-05	65Fi03	*1)

*1) 5E+14 mol/cm**2

2.3.5 Graphs and Data Lists for Temperature Dependence of Desorption Cross Sections and Efficiencies

Fig. 39 and 40 show the temperature dependence of the total cross sections, which were obtained from the decay of the F^+ and H^+ ion signal signals*. Little change in the total cross sections can be seen over the range of temperature up to 400 K. These results are consistent with the results obtained by observing ion signal vs. temperature. On the other hand, desorption efficiencies for neutral molecules. are found to be more sensitive to temperatures as shown in Figs. 41-50. It is seen that on a logarithmic scale desorption efficiencies decrease almost linearly (except Al-alloy) with increasing bakeout temperature. The data in Figs. 41-50 were adopted from the figures in Achard's papers.

Note on Graphs

E_e : incident electron energy

*The source of the F^+ ion signal is probably residual fluorocarbons and /or alkali halides deposited on the surface. It is likely that H^+ ion signal is associated with H_2 and/or H_2O adsorbed on the surface.

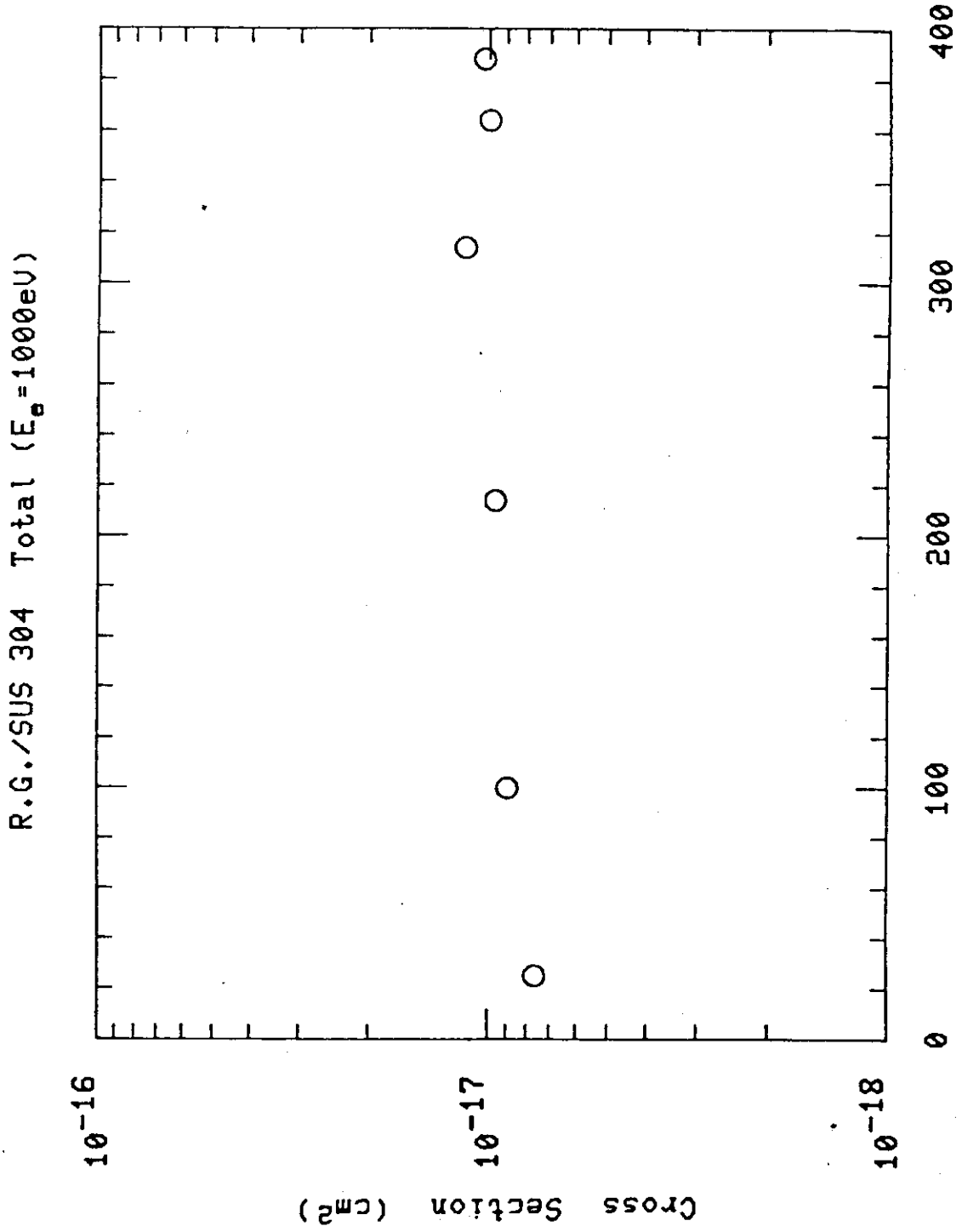

Fig.39 Total desorption cross section as a function of temperature

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
poly		0.100E+04	25	F+	0.760E-17	78Dr03	*1)
poly		0.100E+04	100	F+	0.890E-17	78Dr03	*1)
poly		0.100E+04	214	F+	0.960E-17	78Dr03	*1)
poly		0.100E+04	314	F+	0.115E-16	78Dr03	*1)
poly		0.100E+04	364	F+	0.100E-16	78Dr03	*1)
poly		0.100E+04	388	F+	0.103E-16	78Dr03	*1)

*1) F+ ion signal may be due to NaF or KF.

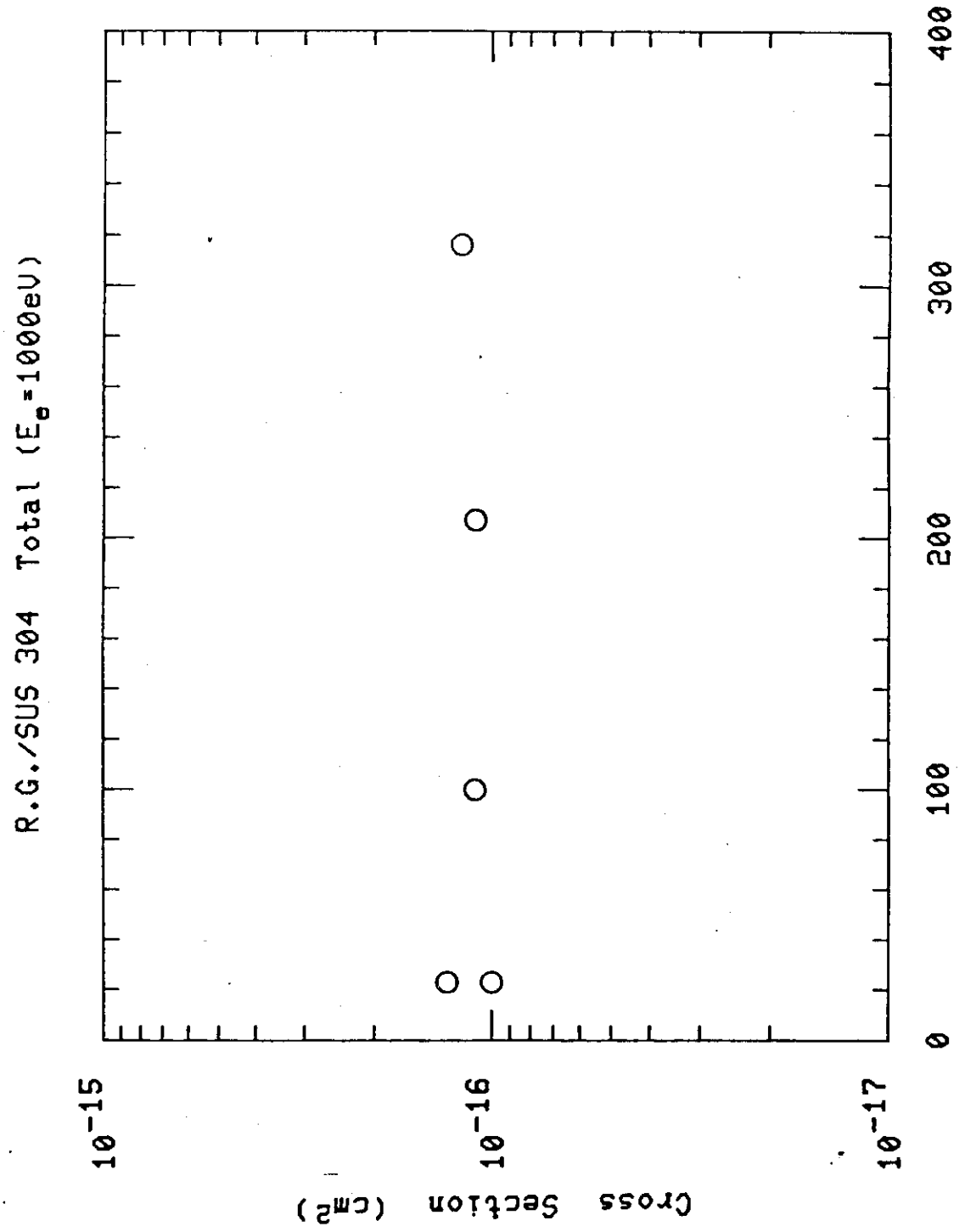

Fig.40 Total desorption cross section as a function of temperature

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Total cross section(cm**2)	Ref.	Remark
poly		0.100E+04	23	H+	0.100E-15	78Dr03	*1)
poly		0.100E+04	23	H+	0.130E-15	78Dr03	*1)
poly		0.100E+04	100	H+	0.110E-15	78Dr03	*1)
poly		0.100E+04	207	H+	0.110E-15	78Dr03	*1)
poly		0.100E+04	316	H+	0.120E-15	78Dr03	*1)

*1) H+ ion signal may be due to H2 or H2O.

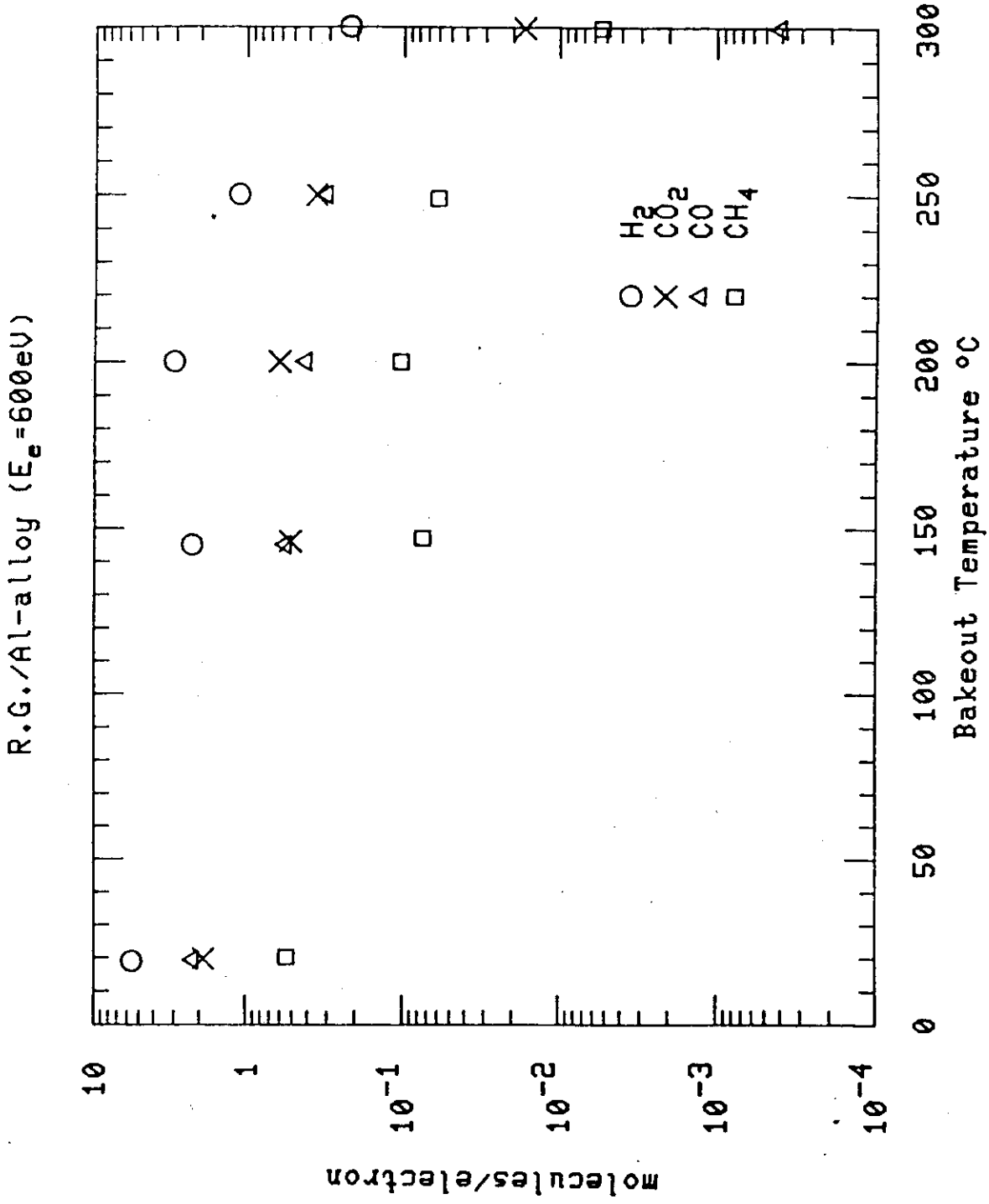

Fig.41 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (K)	Incident energy(eV)	Desorbed species	Molecules per electron	Ref.
Al-alloy	0.191E+02	600	H2	0.559E+01	79Ac01
Al-alloy	0.145E+03	600	H2	0.226E+01	79Ac01
Al-alloy	0.200E+03	600	H2	0.297E+01	79Ac01
Al-alloy	0.250E+03	600	H2	0.113E+01	79Ac01
Al-alloy	0.300E+03	600	H2	0.219E+00	79Ac01
Al-alloy	0.194E+02	600	CO2	0.191E+01	79Ac01
Al-alloy	0.146E+03	600	CO2	0.525E+00	79Ac01
Al-alloy	0.200E+03	600	CO2	0.615E+00	79Ac01
Al-alloy	0.250E+03	600	CO2	0.367E+00	79Ac01
Al-alloy	0.300E+03	600	CO2	0.168E-01	79Ac01
Al-alloy	0.190E+02	600	CO	0.224E+01	79Ac01
Al-alloy	0.145E+03	600	CO	0.560E+00	79Ac01
Al-alloy	0.200E+03	600	CO	0.418E+00	79Ac01
Al-alloy	0.250E+03	600	CO	0.313E+00	79Ac01
Al-alloy	0.300E+03	600	CO	0.404E-03	79Ac01
Al-alloy	0.200E+02	600	CH4	0.546E+00	79Ac01
Al-alloy	0.147E+03	600	CH4	0.752E-01	79Ac01
Al-alloy	0.200E+03	600	CH4	0.104E+00	79Ac01
Al-alloy	0.249E+03	600	CH4	0.608E-01	79Ac01
Al-alloy	0.300E+03	600	CH4	0.529E-02	79Ac01

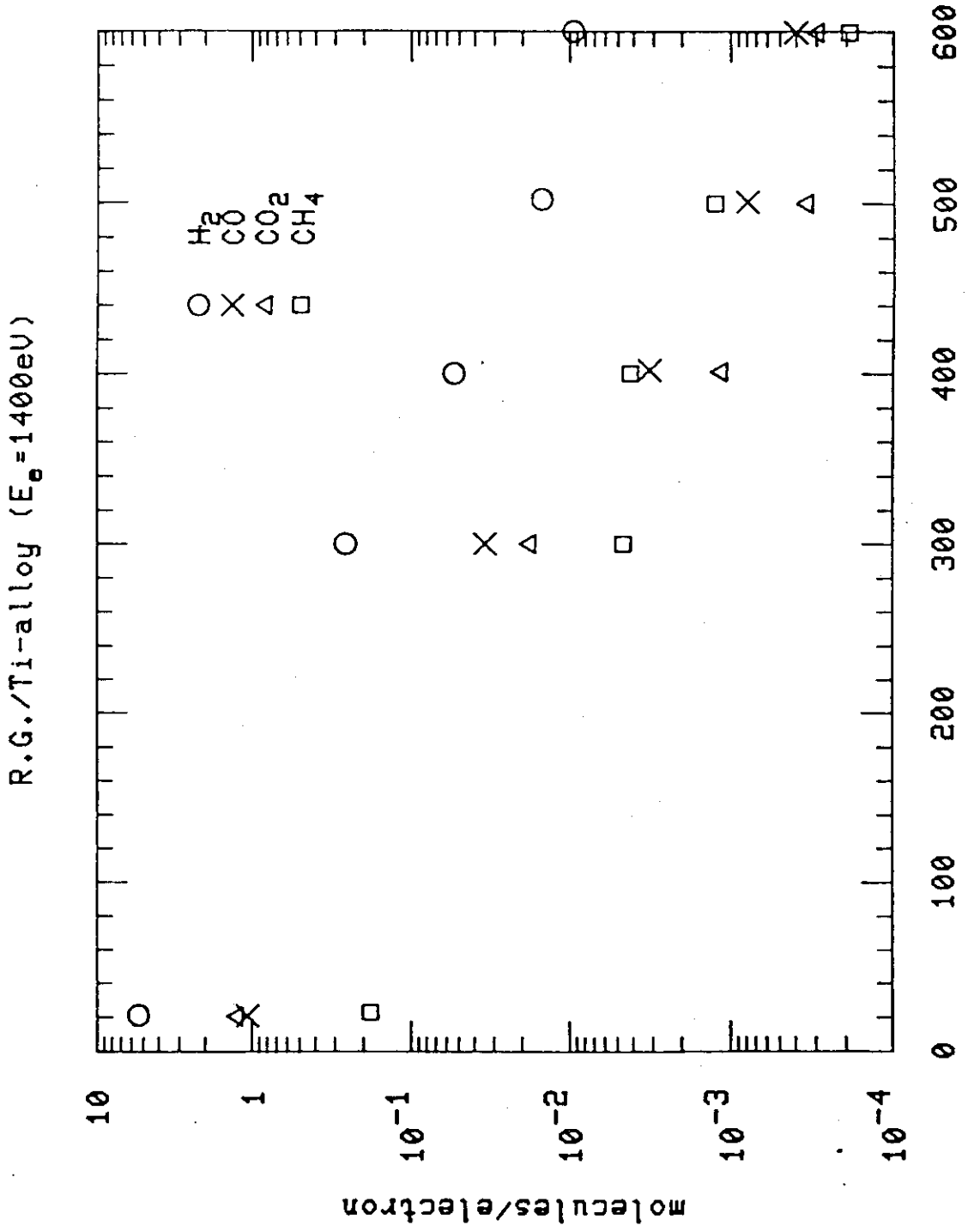

Fig.42 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (K)	Incident energy(eV)	Desorbed species	Molecules per electron	Ref.
Ti-alloy	0.201E+02	1400	H2	0.538E+01	79Ac01
Ti-alloy	0.300E+03	1400	H2	0.258E+00	79Ac01
Ti-alloy	0.400E+03	1400	H2	0.538E-01	79Ac01
Ti-alloy	0.500E+03	1400	H2	0.152E-01	79Ac01
Ti-alloy	0.600E+03	1400	H2	0.946E-02	79Ac01
Ti-alloy	0.201E+02	1400	CO	0.108E+01	79Ac01
Ti-alloy	0.300E+03	1400	CO	0.345E-01	79Ac01
Ti-alloy	0.400E+03	1400	CO	0.316E-02	79Ac01
Ti-alloy	0.500E+03	1400	CO	0.795E-03	79Ac01
Ti-alloy	0.600E+03	1400	CO	0.393E-03	79Ac01
Ti-alloy	0.200E+02	1400	CO2	0.125E+01	79Ac01
Ti-alloy	0.300E+03	1400	CO2	0.178E-01	79Ac01
Ti-alloy	0.400E+02	1400	CO2	0.114E-02	79Ac01
Ti-alloy	0.500E+03	1400	CO2	0.339E-03	79Ac01
Ti-alloy	0.600E+03	1400	CO2	0.290E-03	79Ac01
Ti-alloy	0.201E+02	1400	CH4	0.181E+00	79Ac01
Ti-alloy	0.300E+03	1400	CH4	0.461E-02	79Ac01
Ti-alloy	0.400E+03	1400	CH4	0.415E-02	79Ac01
Ti-alloy	0.500E+03	1400	CH4	0.125E-02	79Ac01
Ti-alloy	0.600E+03	1400	CH4	0.184E-03	79Ac01

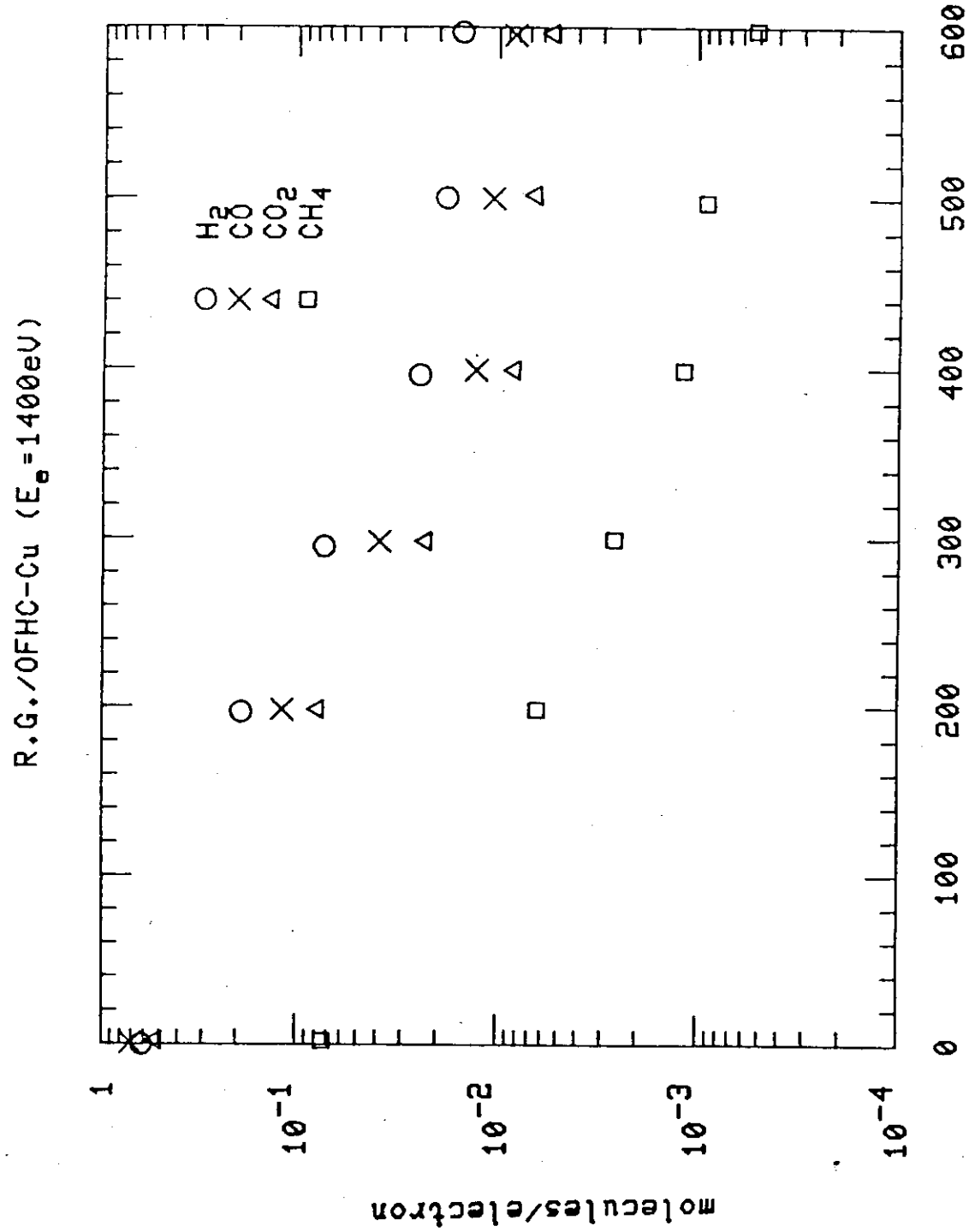

Fig.43 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (K)	Incident energy(eV)	Desorbed species	Molecules per electron	Ref.
OFHC-Cu	0.214E-04	1400	H2	0.615E+00	79Ac01
OFHC-Cu	0.197E+03	1400	H2	0.189E+00	79Ac01
OFHC-Cu	0.295E+03	1400	H2	0.730E-01	79Ac01
OFHC-Cu	0.396E+03	1400	H2	0.244E-01	79Ac01
OFHC-Cu	0.500E+03	1400	H2	0.183E-01	79Ac01
OFHC-Cu	0.597E+03	1400	H2	0.153E-01	79Ac01
OFHC-Cu	0.214E-04	1400	CO	0.712E+00	79Ac01
OFHC-Cu	0.198E+03	1400	CO	0.118E+00	79Ac01
OFHC-Cu	0.298E+03	1400	CO	0.389E-01	79Ac01
OFHC-Cu	0.399E+03	1400	CO	0.128E-01	79Ac01
OFHC-Cu	0.500E+03	1400	CO	0.107E-01	79Ac01
OFHC-Cu	0.596E+03	1400	CO	0.831E-02	79Ac01
OFHC-Cu	0.141E+01	1400	CO2	0.523E+00	79Ac01
OFHC-Cu	0.198E+03	1400	CO2	0.777E-01	79Ac01
OFHC-Cu	0.298E+03	1400	CO2	0.228E-01	79Ac01
OFHC-Cu	0.399E+03	1400	CO2	0.826E-02	79Ac01
OFHC-Cu	0.502E+03	1400	CO2	0.661E-02	79Ac01
OFHC-Cu	0.597E+03	1400	CO2	0.537E-02	79Ac01
OFHC-Cu	0.141E+01	1400	CH4	0.738E-01	79Ac01
OFHC-Cu	0.198E+03	1400	CH4	0.624E-02	79Ac01
OFHC-Cu	0.299E+03	1400	CH4	0.257E-02	79Ac01
OFHC-Cu	0.399E+03	1400	CH4	0.117E-02	79Ac01
OFHC-Cu	0.498E+03	1400	CH4	0.908E-03	79Ac01
OFHC-Cu	0.599E+03	1400	CH4	0.510E-03	79Ac01

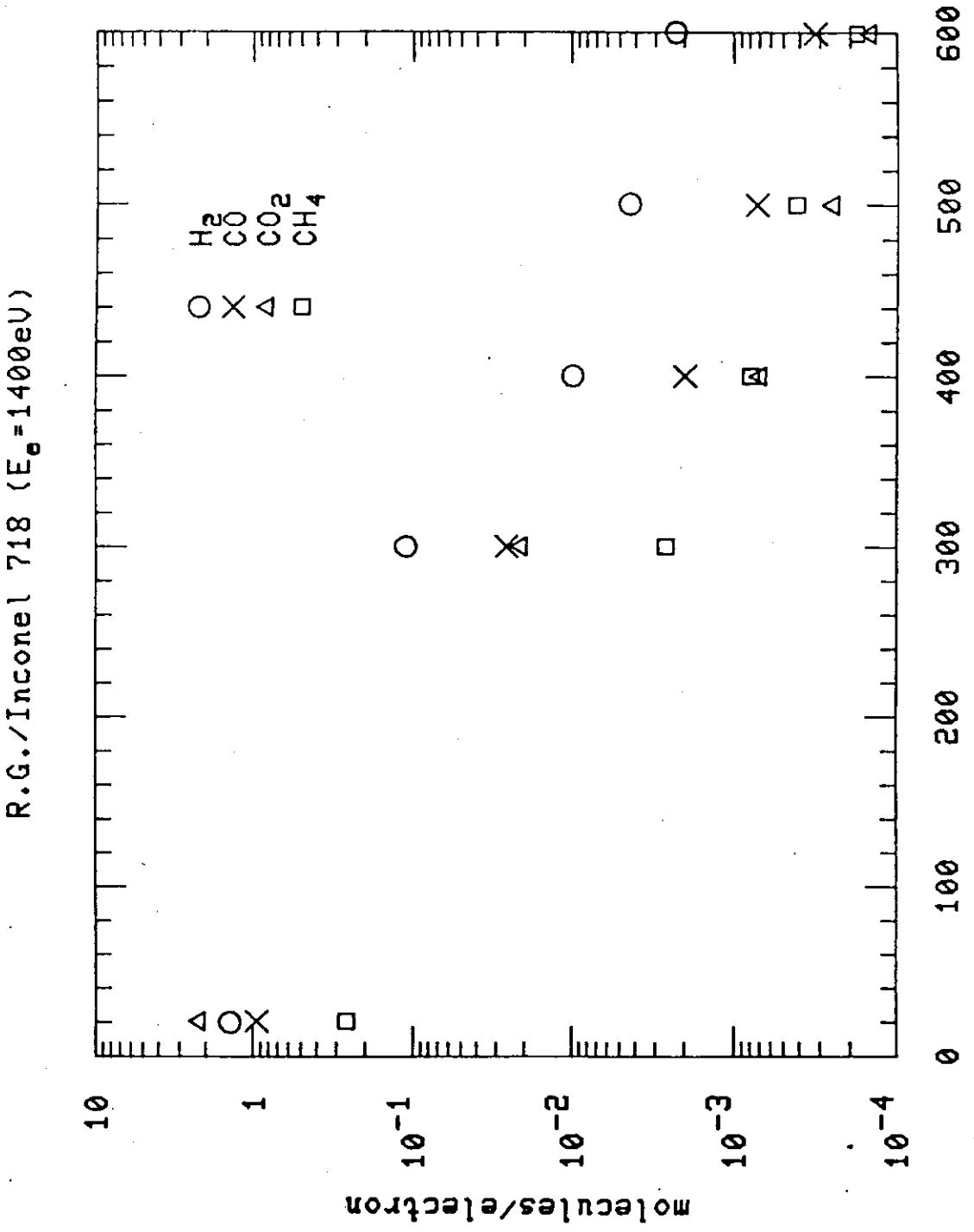

Fig.44 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (K)	Incident energy(eV)	Desorbed species	Molecules per electron	Ref.
In-718	0.201E+02	1400	H2	0.140E+01	79Ac01
In-718	0.300E+03	1400	H2	0.111E+00	79Ac01
In-718	0.400E+03	1400	H2	0.980E-02	79Ac01
In-718	0.500E+03	1400	H2	0.436E-02	79Ac01
In-718	0.600E+03	1400	H2	0.225E-02	79Ac01
In-718	0.201E+02	1400	CO	0.966E+00	79Ac01
In-718	0.300E+03	1400	CO	0.258E-01	79Ac01
In-718	0.400E+03	1400	CO	0.197E-02	79Ac01
In-718	0.500E+03	1400	CO	0.724E-03	79Ac01
In-718	0.600E+03	1400	CO	0.317E-03	79Ac01
In-718	0.200E+02	1400	CO2	0.222E+01	79Ac01
In-718	0.300E+03	1400	CO2	0.208E-01	79Ac01
In-718	0.400E+03	1400	CO2	0.684E-03	79Ac01
In-718	0.500E+03	1400	CO2	0.247E-03	79Ac01
In-718	0.600E+03	1400	CO2	0.145E-03	79Ac01
In-718	0.201E+02	1400	CH4	0.260E+00	79Ac01
In-718	0.300E+03	1400	CH4	0.257E-02	79Ac01
In-718	0.400E+03	1400	CH4	0.778E-03	79Ac01
In-718	0.500E+03	1400	CH4	0.413E-03	79Ac01
In-718	0.600E+03	1400	CH4	0.178E-03	79Ac01

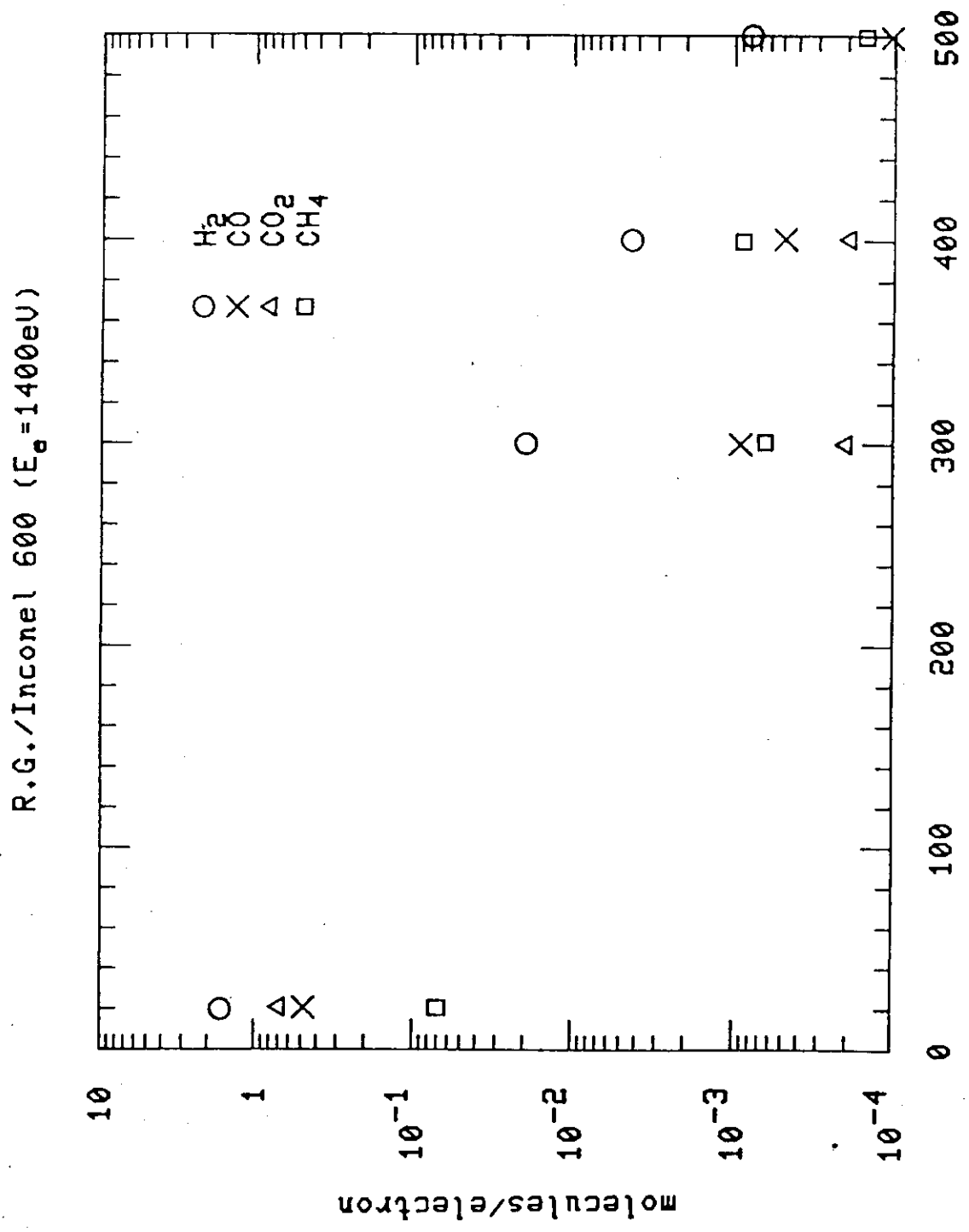

Fig.45 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (K)	Incident energy(eV)	Desorbed species	Molecules per electron	Ref.
In-600	0.200E+02	1400	H2	0.164E+01	79Ac01
In-600	0.300E+03	1400	H2	0.197E-01	79Ac01
In-600	0.400E+03	1400	H2	0.438E-02	79Ac01
In-600	0.500E+03	1400	H2	0.785E-03	79Ac01
In-600	0.201E+02	1400	CO	0.484E+00	79Ac01
In-600	0.300E+03	1400	CO	0.909E-03	79Ac01
In-600	0.401E+03	1400	CO	0.482E-03	79Ac01
In-600	0.500E+03	1400	CO	0.103E-03	79Ac01
In-600	0.203E+02	1400	CO2	0.689E+00	79Ac01
In-600	0.300E+03	1400	CO2	0.198E-03	79Ac01
In-600	0.401E+03	1400	CO2	0.188E-03	79Ac01
In-600	0.200E+02	1400	CH4	0.704E-01	79Ac01
In-600	0.301E+03	1400	CH4	0.639E-03	79Ac01
In-600	0.400E+03	1400	CH4	0.886E-03	79Ac01
In-600	0.500E+03	1400	CH4	0.149E-03	79Ac01

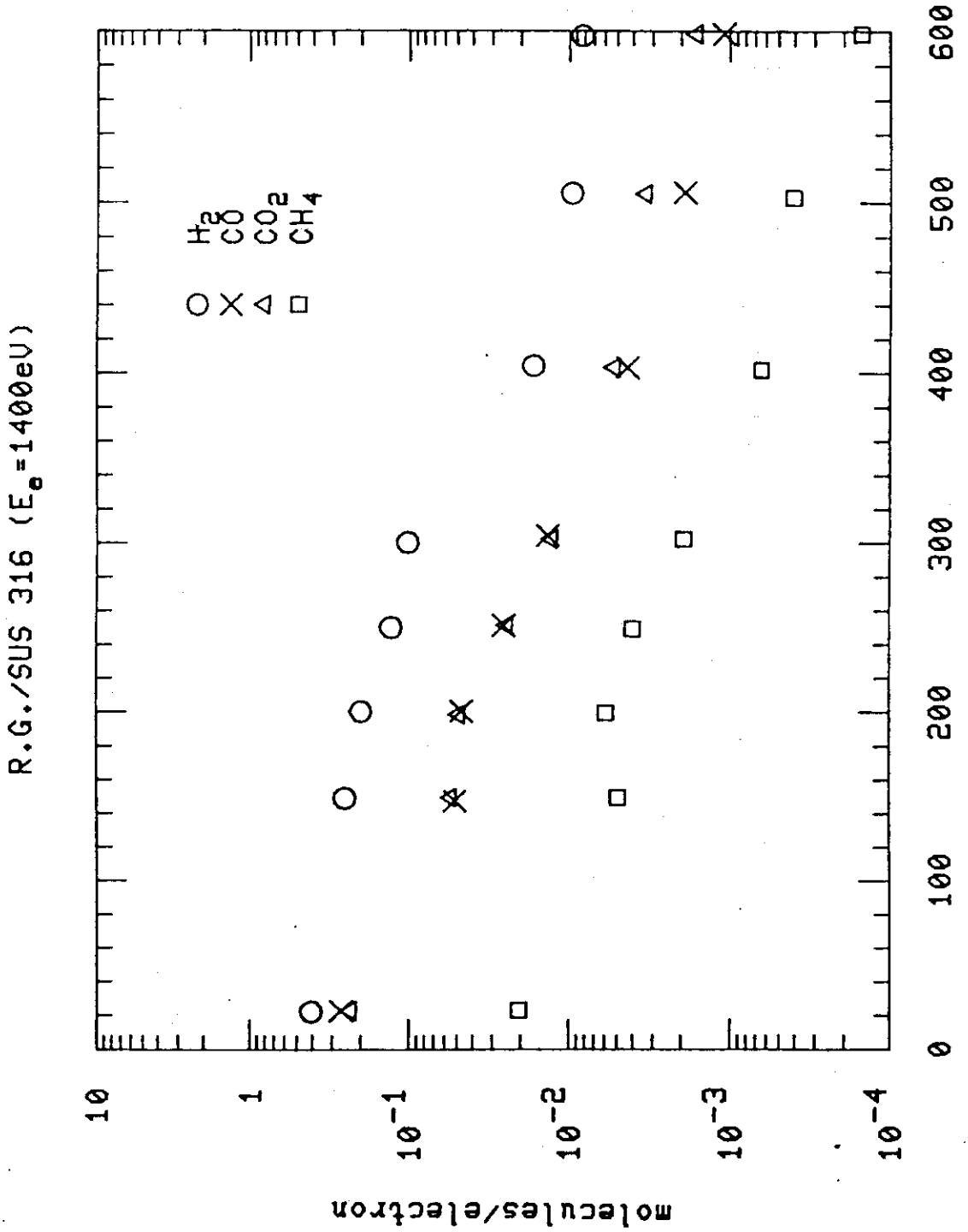

Fig.46 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (K)	Incident energy(eV)	Desorbed species	Molecules per electron	Ref.
SUS 316	0.226E+02	1400	H2	0.407E+00	79Ac01
SUS 316	0.149E+03	1400	H2	0.251E+00	79Ac01
SUS 316	0.200E+03	1400	H2	0.200E+00	79Ac01
SUS 316	0.250E+03	1400	H2	0.130E+00	79Ac01
SUS 316	0.300E+03	1400	H2	0.102E+00	79Ac01
SUS 316	0.404E+03	1400	H2	0.167E-01	79Ac01
SUS 316	0.505E+03	1400	H2	0.970E-02	79Ac01
SUS 316	0.597E+03	1400	H2	0.826E-02	79Ac01
SUS 316	0.222E+02	1400	CO	0.268E+00	79Ac01
SUS 316	0.147E+03	1400	CO	0.515E-01	79Ac01
SUS 316	0.200E+03	1400	CO	0.467E-01	79Ac01
SUS 316	0.251E+03	1400	CO	0.254E-01	79Ac01
SUS 316	0.304E+03	1400	CO	0.136E-01	79Ac01
SUS 316	0.403E+03	1400	CO	0.429E-02	79Ac01
SUS 316	0.506E+03	1400	CO	0.190E-02	79Ac01
SUS 316	0.599E+03	1400	CO	0.108E-02	79Ac01
SUS 316	0.221E+02	1400	CO2	0.232E+00	79Ac01
SUS 316	0.149E+03	1400	CO2	0.549E-01	79Ac01
SUS 316	0.198E+03	1400	CO2	0.482E-01	79Ac01
SUS 316	0.251E+03	1400	CO2	0.242E-01	79Ac01
SUS 316	0.302E+03	1400	CO2	0.128E-01	79Ac01
SUS 316	0.403E+03	1400	CO2	0.520E-02	79Ac01
SUS 316	0.505E+03	1400	CO2	0.332E-02	79Ac01
SUS 316	0.599E+03	1400	CO2	0.159E-02	79Ac01
SUS 316	0.224E+02	1400	CH4	0.204E-01	79Ac01
SUS 316	0.149E+03	1400	CH4	0.489E-02	79Ac01
SUS 316	0.199E+03	1400	CH4	0.583E-02	79Ac01
SUS 316	0.249E+03	1400	CH4	0.397E-02	79Ac01
SUS 316	0.302E+03	1400	CH4	0.193E-02	79Ac01
SUS 316	0.402E+03	1400	CH4	0.640E-03	79Ac01
SUS 316	0.503E+03	1400	CH4	0.402E-03	79Ac01
SUS 316	0.599E+03	1400	CH4	0.149E-03	79Ac01

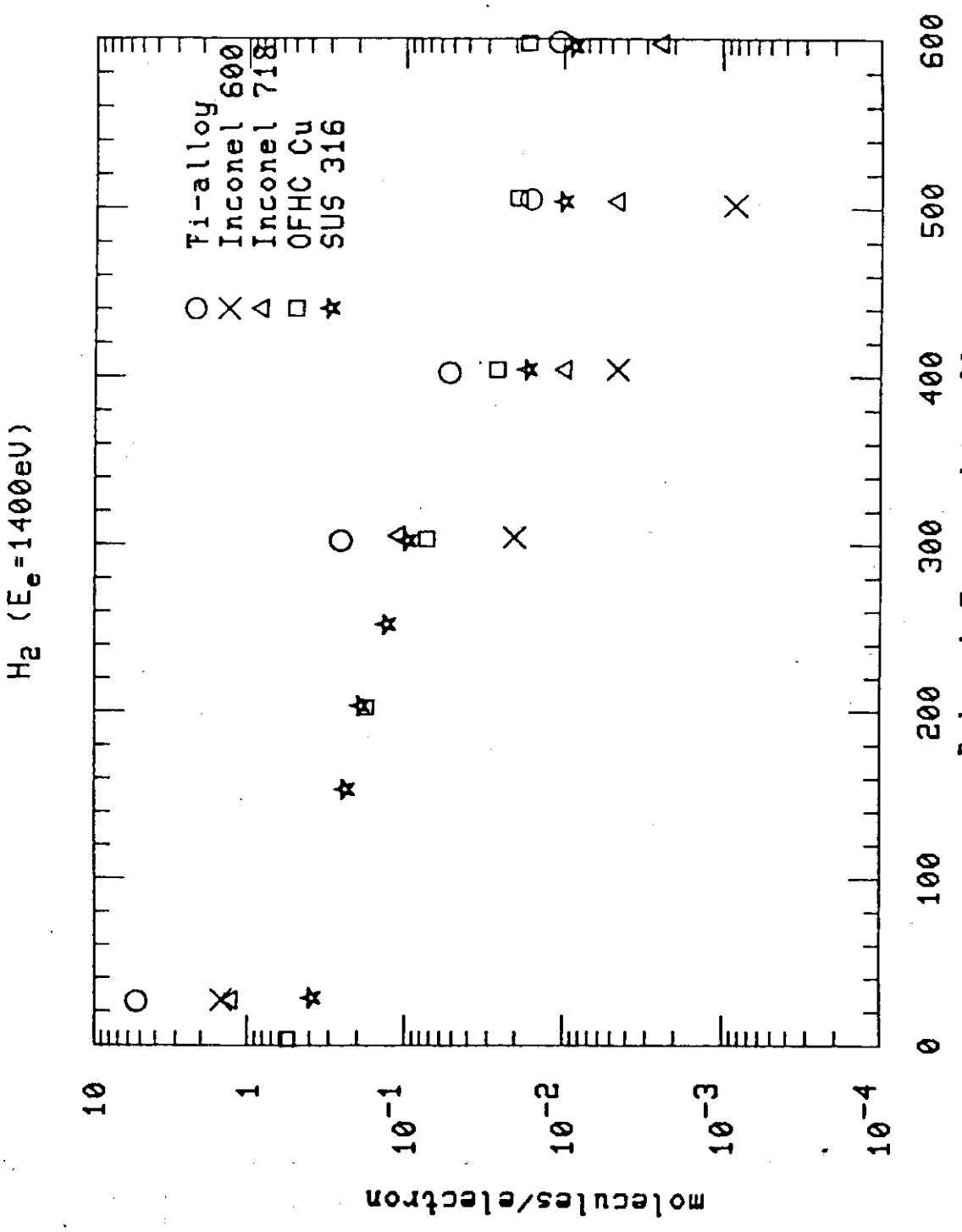

Fig.47 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (deg C)	Incident energy(ev)	Desorbed species	Molecules per electron	Ref.
Ti-alloy	0.263E+02	1400	H2	0.529E+01	79Ac01
Ti-alloy	0.302E+03	1400	H2	0.255E+00	79Ac01
Ti-alloy	0.402E+03	1400	H2	0.525E-01	79Ac01
Ti-alloy	0.505E+03	1400	H2	0.163E-01	79Ac01
Ti-alloy	0.598E+03	1400	H2	0.107E-01	79Ac01
In 600	0.263E+02	1400	H2	0.149E+01	79Ac01
In 600	0.304E+03	1400	H2	0.203E-01	79Ac01
In 600	0.404E+03	1400	H2	0.451E-02	79Ac01
In 600	0.502E+03	1400	H2	0.845E-03	79Ac01
In 718	0.261E+02	1400	H2	0.127E+01	79Ac01
In 718	0.305E+03	1400	H2	0.110E+00	79Ac01
In 718	0.404E+03	1400	H2	0.965E-02	79Ac01
In 718	0.504E+03	1400	H2	0.453E-02	79Ac01
In 718	0.598E+03	1400	H2	0.237E-02	79Ac01
OFHC Cu	0.287E+01	1400	H2	0.558E+00	79Ac01
OFHC Cu	0.202E+03	1400	H2	0.177E+00	79Ac01
OFHC Cu	0.303E+03	1400	H2	0.730E-01	79Ac01
OFHC Cu	0.404E+03	1400	H2	0.262E-01	79Ac01
OFHC Cu	0.506E+03	1400	H2	0.197E-01	79Ac01
OFHC Cu	0.598E+03	1400	H2	0.166E-01	79Ac01
SUS 316	0.276E+02	1400	H2	0.388E+00	79Ac01
SUS 316	0.153E+03	1400	H2	0.238E+00	79Ac01
SUS 316	0.203E+03	1400	H2	0.191E+00	79Ac01
SUS 316	0.252E+03	1400	H2	0.131E+00	79Ac01
SUS 316	0.302E+03	1400	H2	0.971E-01	79Ac01
SUS 316	0.404E+03	1400	H2	0.168E-01	79Ac01
SUS 316	0.504E+03	1400	H2	0.999E-02	79Ac01
SUS 316	0.596E+03	1400	H2	0.855E-02	79Ac01

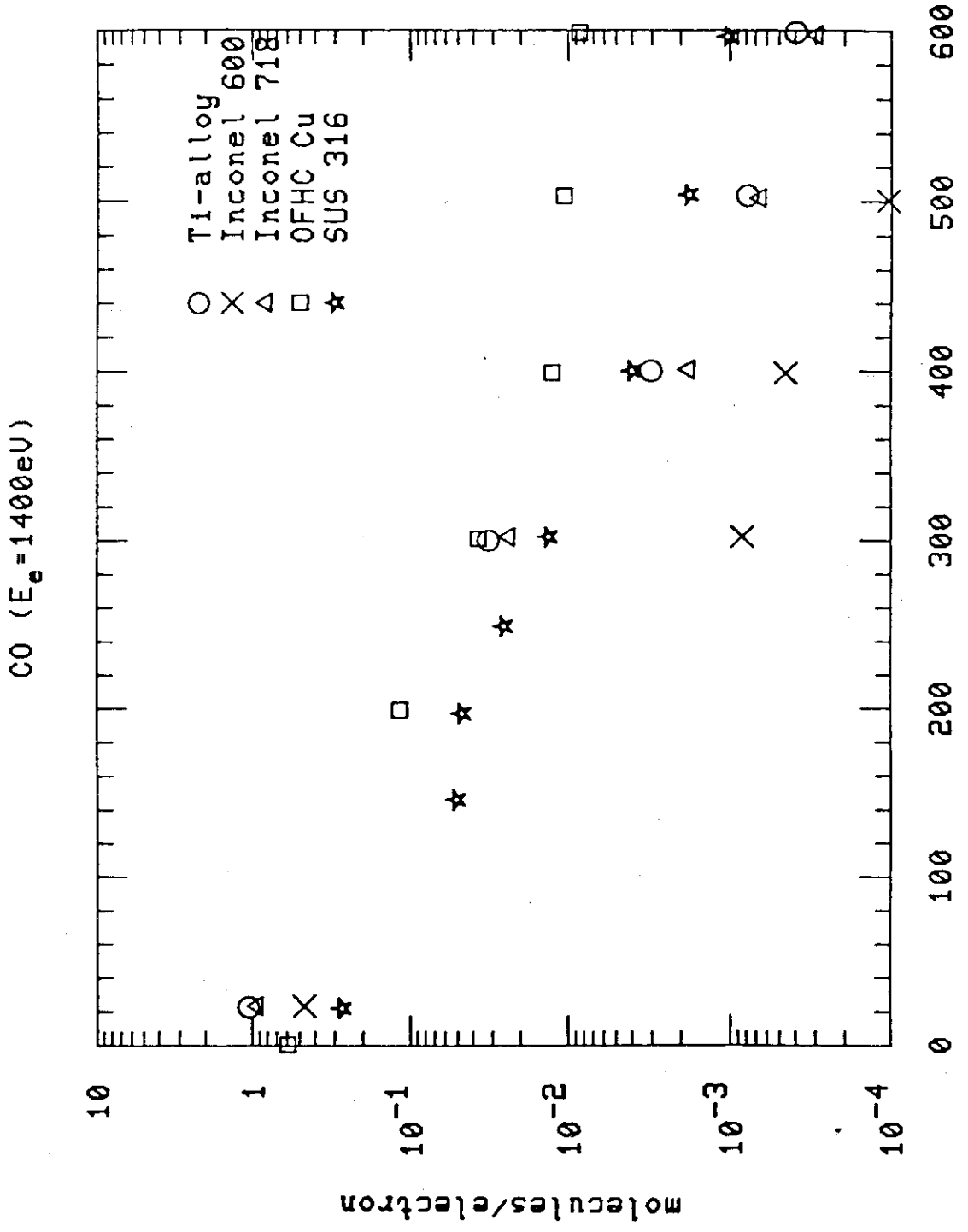

Fig.48 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (deg C)	Incident energy(eV)	Desorbed species	Molecules per electron	Ref.
Ti-alloy	0.228E+02	1400	CO	0.105E+01	79Ac02
Ti-alloy	0.300E+03	1400	CO	0.320E-01	79Ac02
Ti-alloy	0.400E+03	1400	CO	0.305E-02	79Ac02
Ti-alloy	0.503E+03	1400	CO	0.787E-03	79Ac02
Ti-alloy	0.599E+03	1400	CO	0.394E-03	79Ac02
In 600	0.227E+02	1400	CO	0.469E+00	79Ac02
In 600	0.302E+03	1400	CO	0.853E-03	79Ac02
In 600	0.399E+03	1400	CO	0.455E-03	79Ac02
In 600	0.501E+03	1400	CO	0.103E-03	79Ac02
In 718	0.228E+02	1400	CO	0.937E+00	79Ac02
In 718	0.302E+03	1400	CO	0.236E-01	79Ac02
In 718	0.401E+03	1400	CO	0.179E-02	79Ac02
In 718	0.502E+03	1400	CO	0.649E-03	79Ac02
In 718	0.598E+03	1400	CO	0.290E-03	79Ac02
OFHC Cu	0.000E+00	1400	CO	0.597E+00	79Ac02
OFHC Cu	0.199E+03	1400	CO	0.116E+00	79Ac02
OFHC Cu	0.301E+03	1400	CO	0.370E-01	79Ac02
OFHC Cu	0.399E+03	1400	CO	0.126E-01	79Ac02
OFHC Cu	0.503E+03	1400	CO	0.106E-01	79Ac02
OFHC Cu	0.599E+03	1400	CO	0.843E-02	79Ac02
SUS 316	0.213E+02	1400	CO	0.271E+00	79Ac02
SUS 316	0.146E+03	1400	CO	0.509E-01	79Ac02
SUS 316	0.197E+03	1400	CO	0.470E-01	79Ac02
SUS 316	0.249E+03	1400	CO	0.255E-01	79Ac02
SUS 316	0.302E+03	1400	CO	0.134E-01	79Ac02
SUS 316	0.400E+03	1400	CO	0.401E-02	79Ac02
SUS 316	0.504E+03	1400	CO	0.179E-02	79Ac02
SUS 316	0.597E+03	1400	CO	0.102E-02	79Ac02

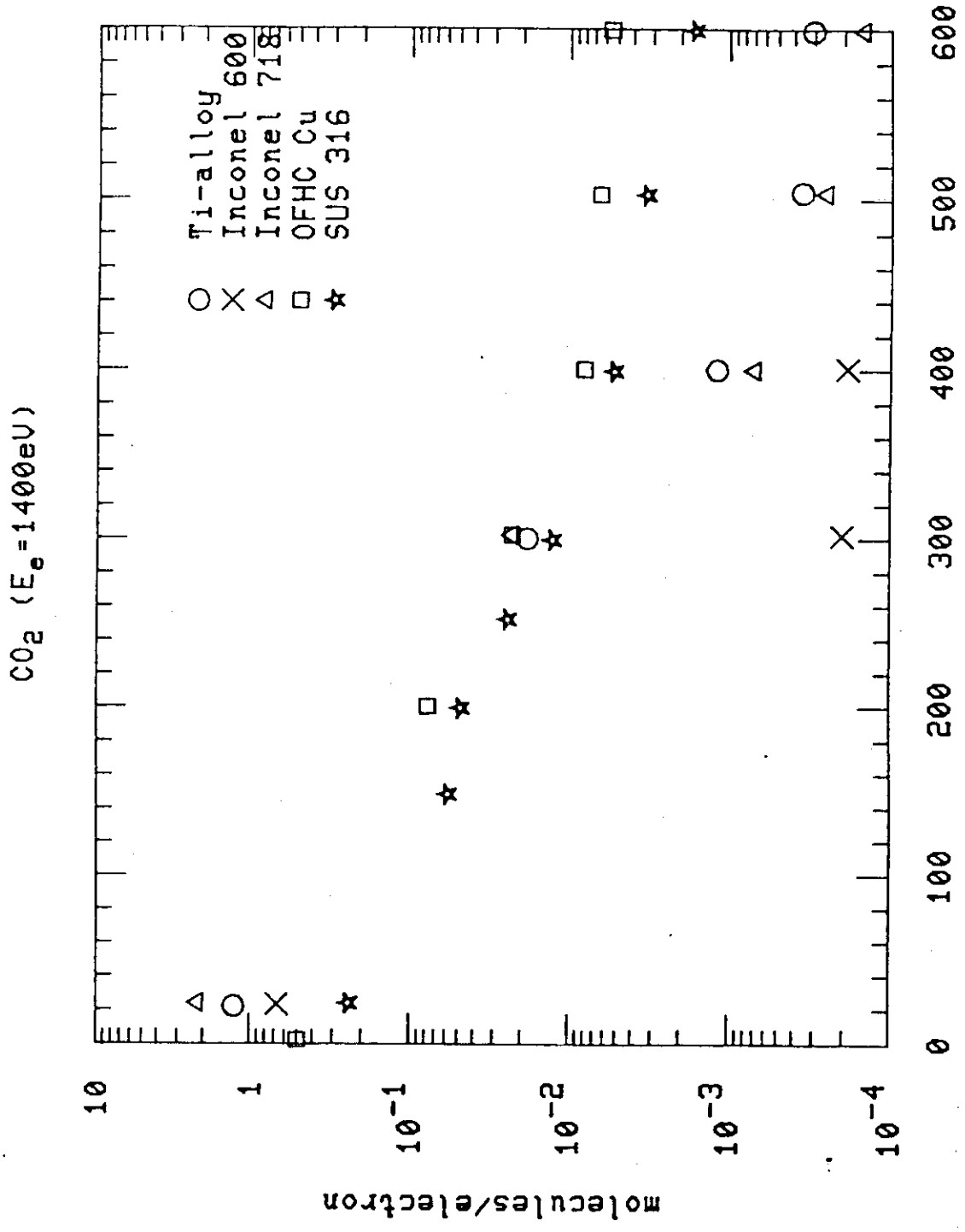

Fig.49 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (deg C)	Incident energy(eV)	Desorbed species	Molecules per lelctron	Ref.
Ti-alloy	0.222E+02	1400	CO2	0.126E+01	79Ac02
Ti-alloy	0.300E+03	1400	CO2	0.184E-01	79Ac02
Ti-alloy	0.400E+03	1400	CO2	0.119E-02	79Ac02
Ti-alloy	0.504E+03	1400	CO2	0.357E-03	79Ac02
Ti-alloy	0.599E+03	1400	CO2	0.305E-03	79Ac02
In 600	0.226E+02	1400	CO2	0.672E+00	79Ac02
In 600	0.302E+03	1400	CO2	0.199E-03	79Ac02
In 600	0.401E+03	1400	CO2	0.184E-03	79Ac02
In 718	0.233E+02	1400	CO2	0.218E+01	79Ac02
In 718	0.302E+03	1400	CO2	0.231E-01	79Ac02
In 718	0.400E+03	1400	CO2	0.689E-03	79Ac02
In 718	0.504E+03	1400	CO2	0.250E-03	79Ac02
In 718	0.600E+03	1400	CO2	0.147E-03	79Ac02
OFHC Cu	0.151E+01	1400	CO2	0.500E+00	79Ac02
OFHC Cu	0.200E+03	1400	CO2	0.769E-01	79Ac02
OFHC Cu	0.302E+03	1400	CO2	0.231E-01	79Ac02
OFHC Cu	0.400E+03	1400	CO2	0.801E-02	79Ac02
OFHC Cu	0.503E+03	1400	CO2	0.642E-02	79Ac02
OFHC Cu	0.600E+03	1400	CO2	0.549E-02	79Ac02
SUS 316	0.233E+02	1400	CO2	0.240E+00	79Ac02
SUS 316	0.148E+03	1400	CO2	0.578E-01	79Ac02
SUS 316	0.199E+03	1400	CO2	0.482E-01	79Ac02
SUS 316	0.252E+03	1400	CO2	0.244E-01	79Ac02
SUS 316	0.299E+03	1400	CO2	0.127E-01	79Ac02
SUS 316	0.399E+03	1400	CO2	0.518E-02	79Ac02
SUS 316	0.503E+03	1400	CO2	0.326E-02	79Ac02
SUS 316	0.600E+03	1400	CO2	0.163E-02	79Ac02

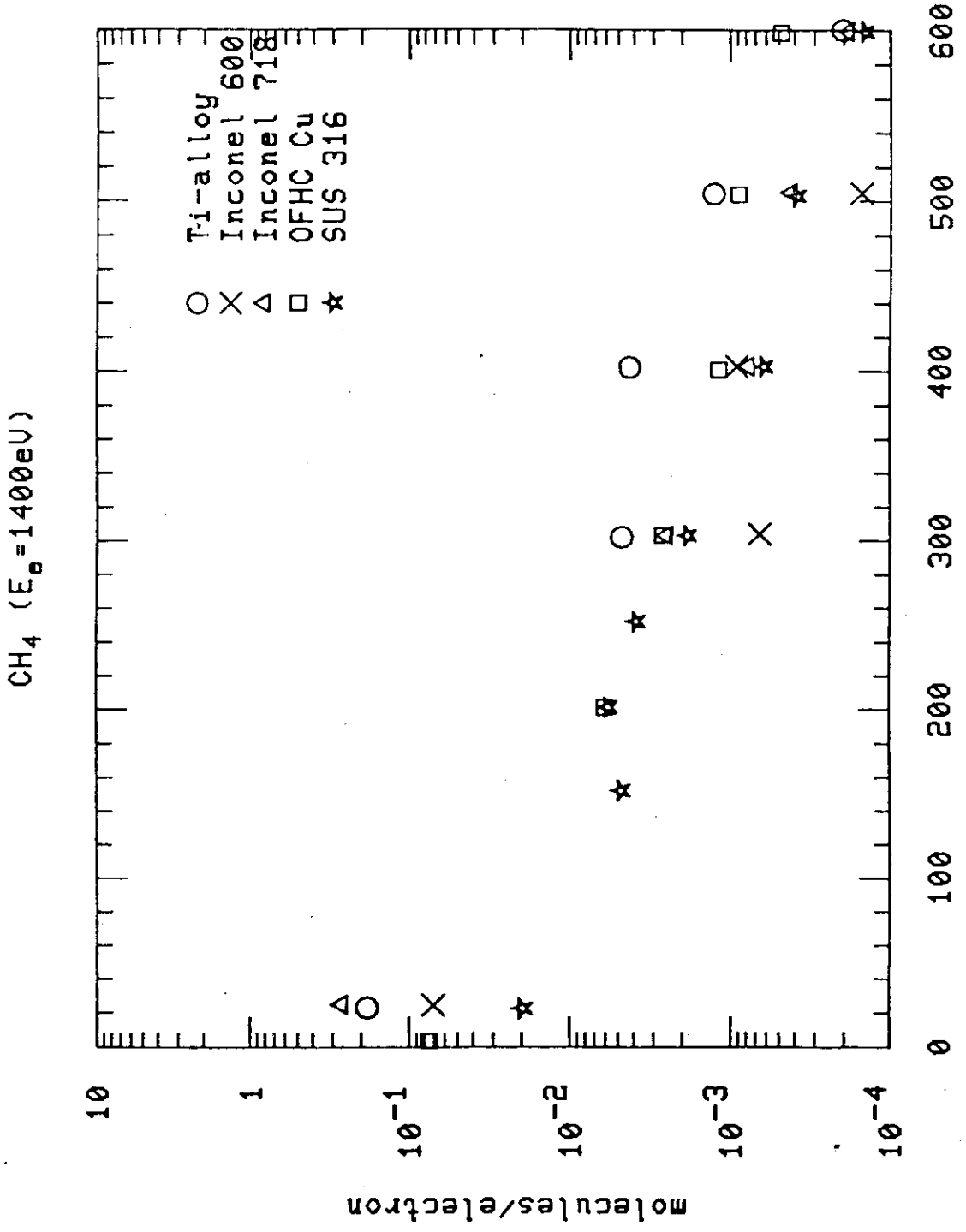

Fig.50 Desorption efficiency as a function of temperature

DATA LIST

Substrate	Temp. (deg C)	Incident energy(eV)	Desorbed species	Molecules per electron	Ref.
Ti-alloy	0.234E+02	1400	CH4	0.183E+00	79Ac02
Ti-alloy	0.302E+03	1400	CH4	0.475E-02	79Ac02
Ti-alloy	0.402E+03	1400	CH4	0.423E-02	79Ac02
Ti-alloy	0.504E+03	1400	CH4	0.128E-02	79Ac02
Ti-alloy	0.600E+03	1400	CH4	0.200E-03	79Ac02
In 600	0.240E+02	1400	CH4	0.708E-01	79Ac02
In 600	0.304E+03	1400	CH4	0.657E-03	79Ac02
In 600	0.403E+03	1400	CH4	0.902E-03	79Ac02
In 600	0.505E+03	1400	CH4	0.150E-03	79Ac02
In 718	0.246E+02	1400	CH4	0.265E+00	79Ac02
In 718	0.303E+03	1400	CH4	0.246E-02	79Ac02
In 718	0.403E+03	1400	CH4	0.768E-03	79Ac02
In 718	0.505E+03	1400	CH4	0.415E-03	79Ac02
In 718	0.600E+03	1400	CH4	0.181E-03	79Ac02
OFHC Cu	0.275E+01	1400	CH4	0.753E-01	79Ac02
OFHC Cu	0.201E+03	1400	CH4	0.598E-02	79Ac02
OFHC Cu	0.303E+03	1400	CH4	0.262E-02	79Ac02
OFHC Cu	0.401E+03	1400	CH4	0.117E-02	79Ac02
OFHC Cu	0.504E+03	1400	CH4	0.884E-03	79Ac02
OFHC Cu	0.599E+03	1400	CH4	0.477E-03	79Ac02
SUS 316	0.220E+02	1400	CH4	0.199E-01	79Ac02
SUS 316	0.152E+03	1400	CH4	0.475E-02	79Ac02
SUS 316	0.201E+03	1400	CH4	0.570E-02	79Ac02
SUS 316	0.252E+03	1400	CH4	0.383E-02	79Ac02
SUS 316	0.303E+03	1400	CH4	0.184E-02	79Ac02
SUS 316	0.403E+03	1400	CH4	0.613E-03	79Ac02
SUS 316	0.503E+03	1400	CH4	0.383E-03	79Ac02
SUS 316	0.600E+03	1400	CH4	0.143E-03	79Ac02

2.3.6 Graphs and Data Lists for Exposure Dependence of Desorption Efficiencies.

Figures 51-55 show the dependence of desorption efficiency on exposure. The rate of rise of efficiency in the initial stage of exposure is quite rapid. With increasing exposure, the efficiency increases and reaches saturation after an exposure of about 10^4 L. For some cases, Figs. 51 and 55, a delay in the onset of ion production is observed, which is due to the preferential adsorption of gases: Adsorption occurs at first only at very tightly bound state, from which very few numbers of ions are desorbed. When the initial state is almost occupied, more weakly bound state starts to be filled in, from which appreciable ion current becomes observed.

Note on Graphs

L : Langmuir, 1 L = 10^{-6} Torr·sec

E_e : incident electron energy

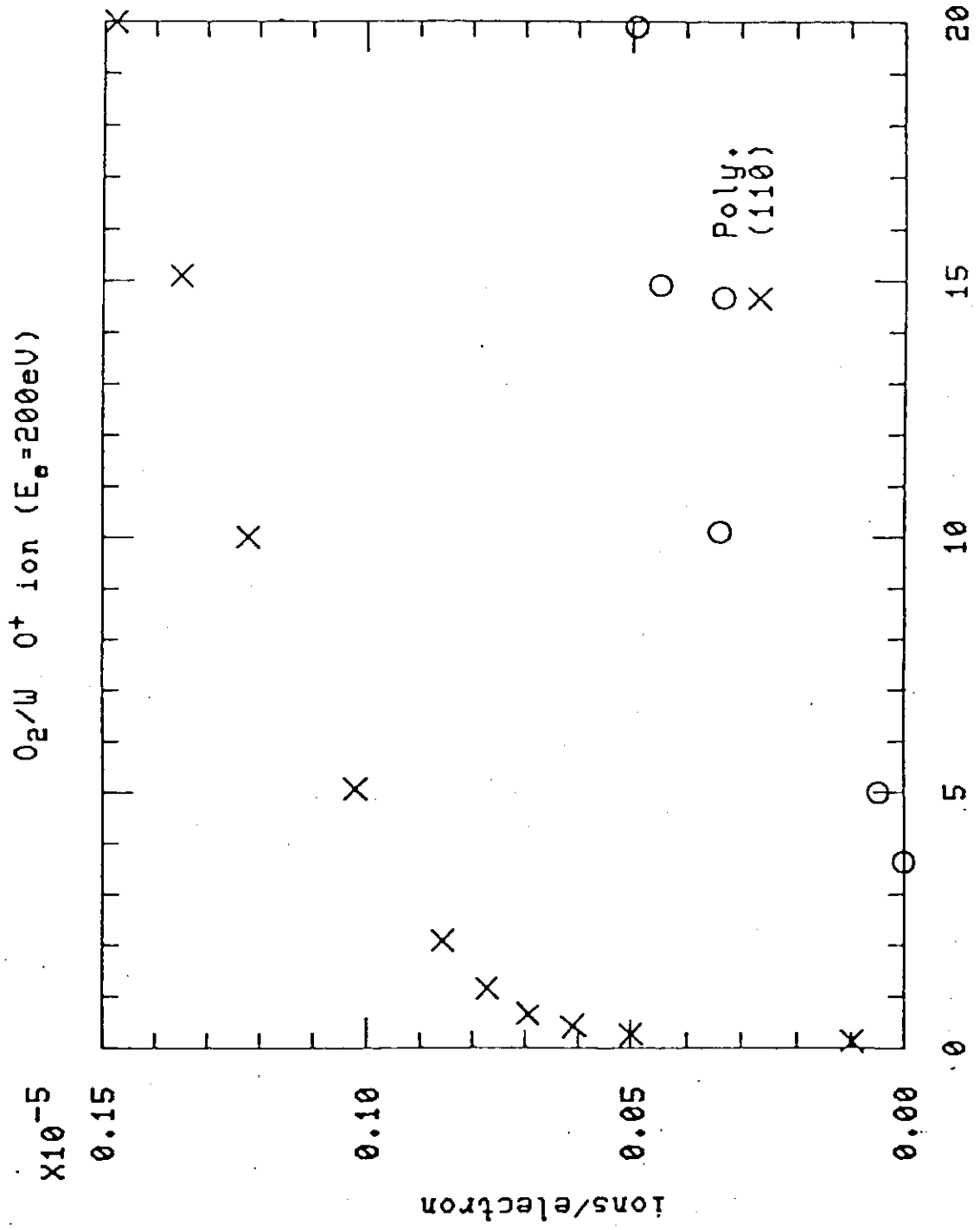

Fig.51 Desorption efficiency as a function of exposure

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
poly		0.200E+03	300	O+	0.123E-08	74As01	3.7L
poly		0.200E+03	300	O+	0.493E-07	74As01	5L
poly		0.200E+03	300	O+	0.339E-06	74As01	10L
poly		0.200E+03	300	O+	0.449E-06	74As01	15L
poly		0.200E+03	300	O+	0.493E-06	74As01	20L
110		0.200E+03	300	O+	0.984E-07	74As01	0.20L
110		0.200E+03	300	O+	0.504E-06	74As01	0.20L
110		0.200E+03	300	O+	0.610E-06	74As01	0.20L
110		0.200E+03	300	O+	0.695E-06	74As01	0.20L
110		0.200E+03	300	O+	0.780E-06	74As01	1.1L
110		0.200E+03	300	O+	0.860E-06	74As01	2.0L
110		0.200E+03	300	O+	0.102E-05	74As01	5.0L
110		0.200E+03	300	O+	0.122E-05	74As01	10.0L
110		0.200E+03	300	O+	0.135E-05	74As01	15.0L
110		0.200E+03	300	O+	0.148E-05	74As01	20.0L

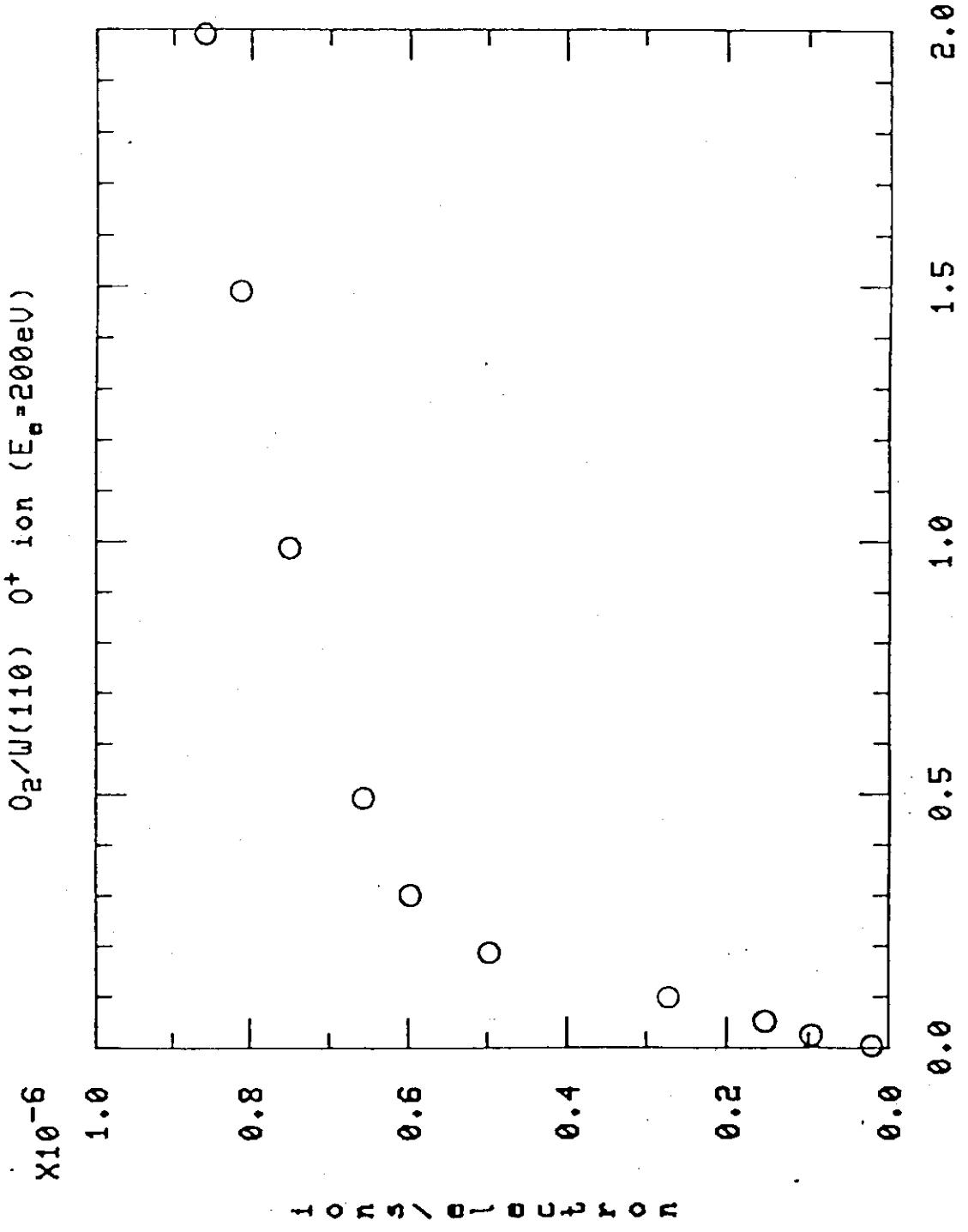

Fig.52 Desorption efficiency as a function of exposure

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
110		0.200E+03	300	O+	0.217E-07	74As01	0.005L
110		0.200E+03	300	O+	0.973E-07	74As01	0.02L
110		0.200E+03	300	O+	0.154E-06	74As01	0.05L
110		0.200E+03	300	O+	0.273E-06	74As01	0.20L
110		0.200E+03	300	O+	0.502E-06	74As01	0.20L
110		0.200E+03	300	O+	0.598E-06	74As01	0.20L
110		0.200E+03	300	O+	0.658E-06	74As01	0.20L
110		0.200E+03	300	O+	0.752E-06	74As01	1.00L
110		0.200E+03	300	O+	0.813E-06	74As01	1.50L
110		0.200E+03	300	O+	0.859E-06	74As01	2.00L

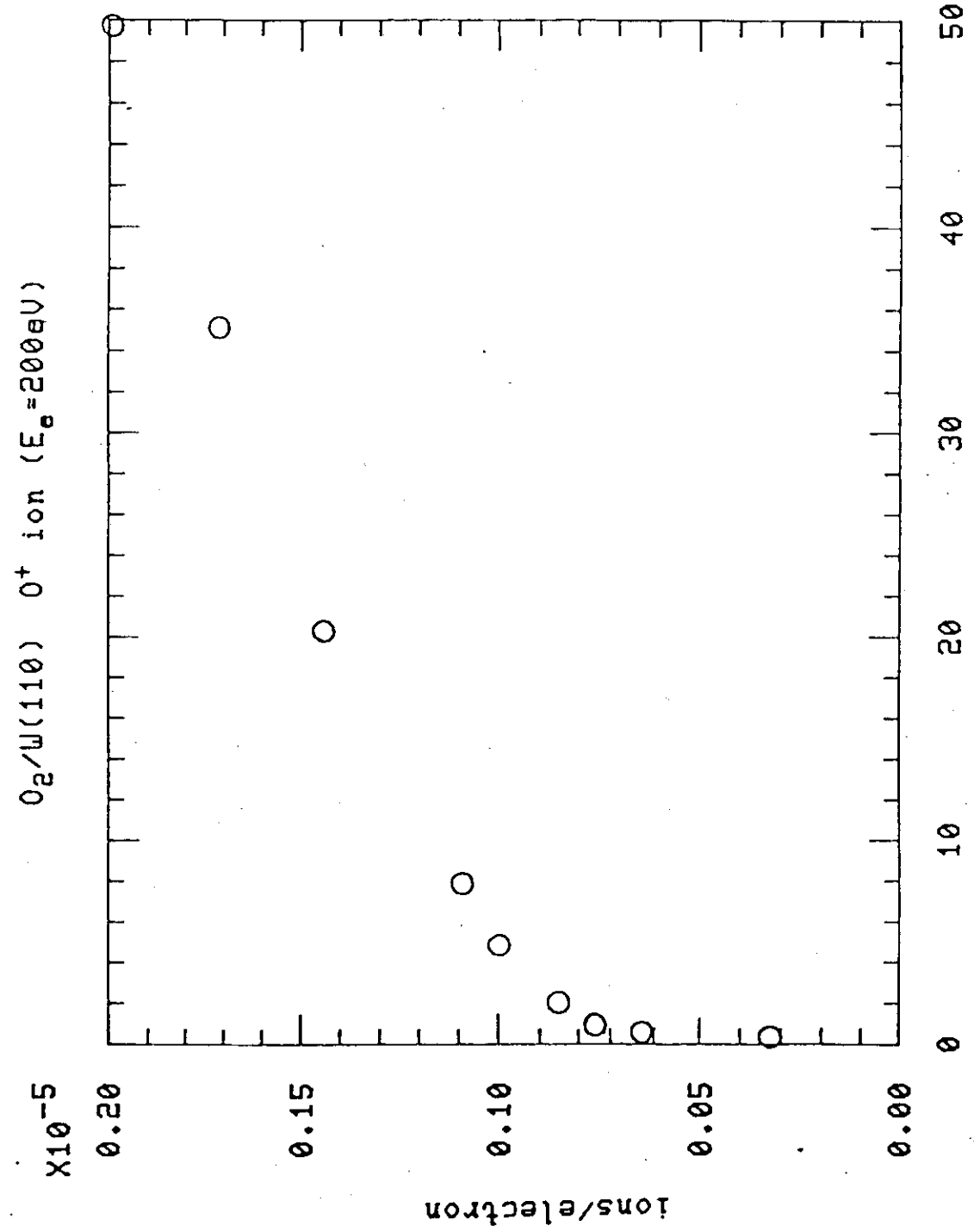

Fig.53 Desorption efficiency as a function of exposure

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
110		0.200E+03	300	O+	0.327E-06	72As02	*1)
110		0.200E+03	300	O+	0.620E-06	72As02	*2)
110		0.200E+03	300	O+	0.760E-06	72As02	*9)
110		0.200E+03	300	O+	0.850E-06	72As02	*3)
110		0.200E+03	300	O+	0.998E-06	72As02	*4)
110		0.200E+03	300	O+	0.109E-05	72As02	*5)
110		0.200E+03	300	O+	0.144E-05	72As02	*6)
110		0.200E+03	300	O+	0.171E-05	72As02	*7)
110		0.200E+03	300	O+	0.197E-05	72As02	*8)

*1) 0.1L
*2) 0.5L
*3) 2.0L
*4) 5.0L
*5) 8.0L
*6) 20.0L
*7) 35.0L
*8) 50.0L
*9) 1.0L

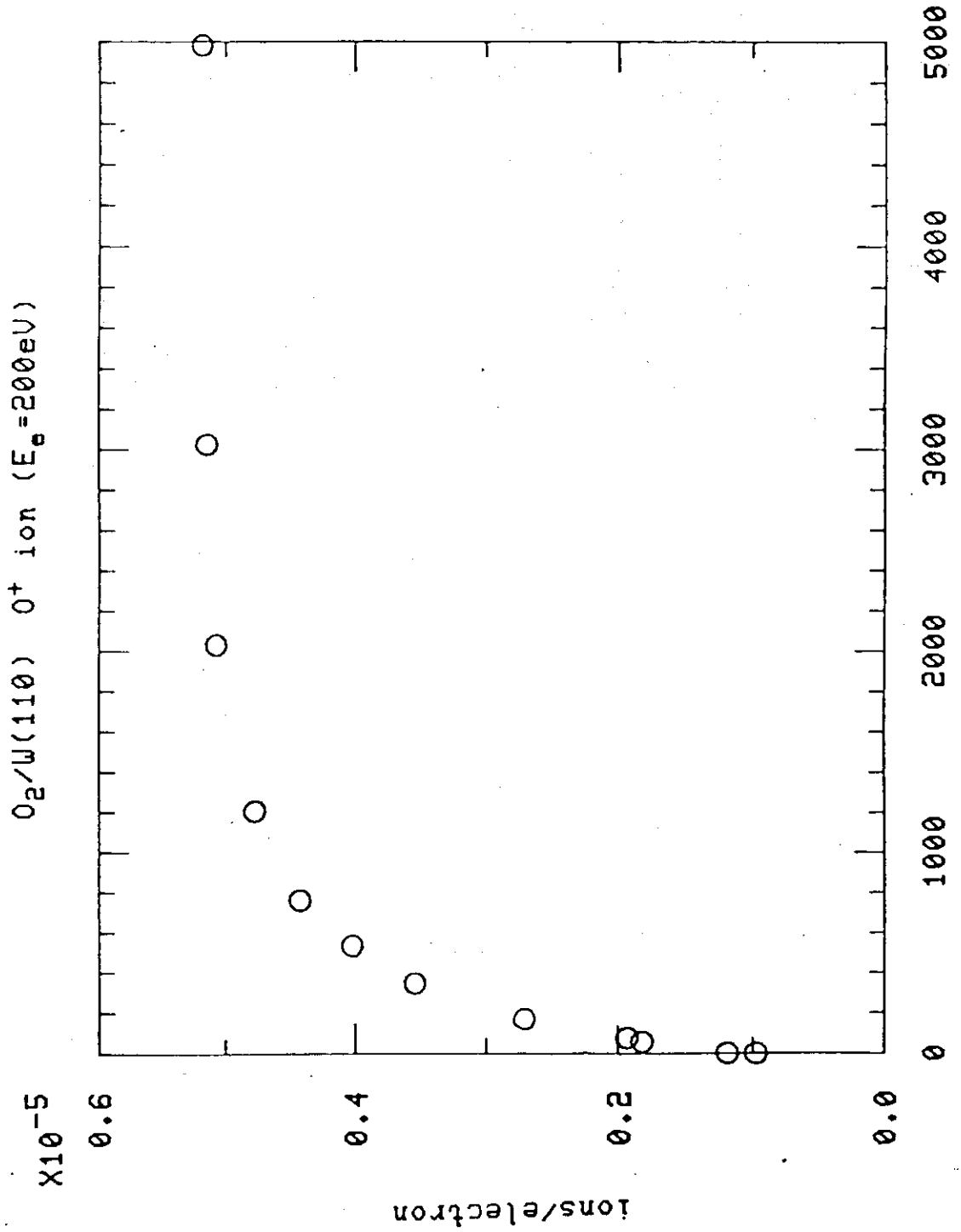

Fig.54 Desorption efficiency as a function of exposure

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
110		0.200E+03	300	O+	0.977E-06	74As01	0.7L
110		0.200E+03	300	O+	0.119E-05	74As01	1.0L
110		0.200E+03	300	O+	0.180E-05	74As01	60.0L
110		0.200E+03	300	O+	0.193E-05	74As01	93.0L
110		0.200E+03	300	O+	0.271E-05	74As01	200L
110		0.200E+03	300	O+	0.365E-05	74As01	200L
110		0.200E+03	300	O+	0.405E-05	74As01	200L
110		0.200E+03	300	O+	0.440E-05	74As01	200L
110		0.200E+03	300	O+	0.475E-05	74As01	2000L
110		0.200E+03	300	O+	0.507E-05	74As01	2000L
110		0.200E+03	200	O+	0.513E-05	74As01	2000L
110		0.200E+03	300	O+	0.518E-05	74As01	2000L

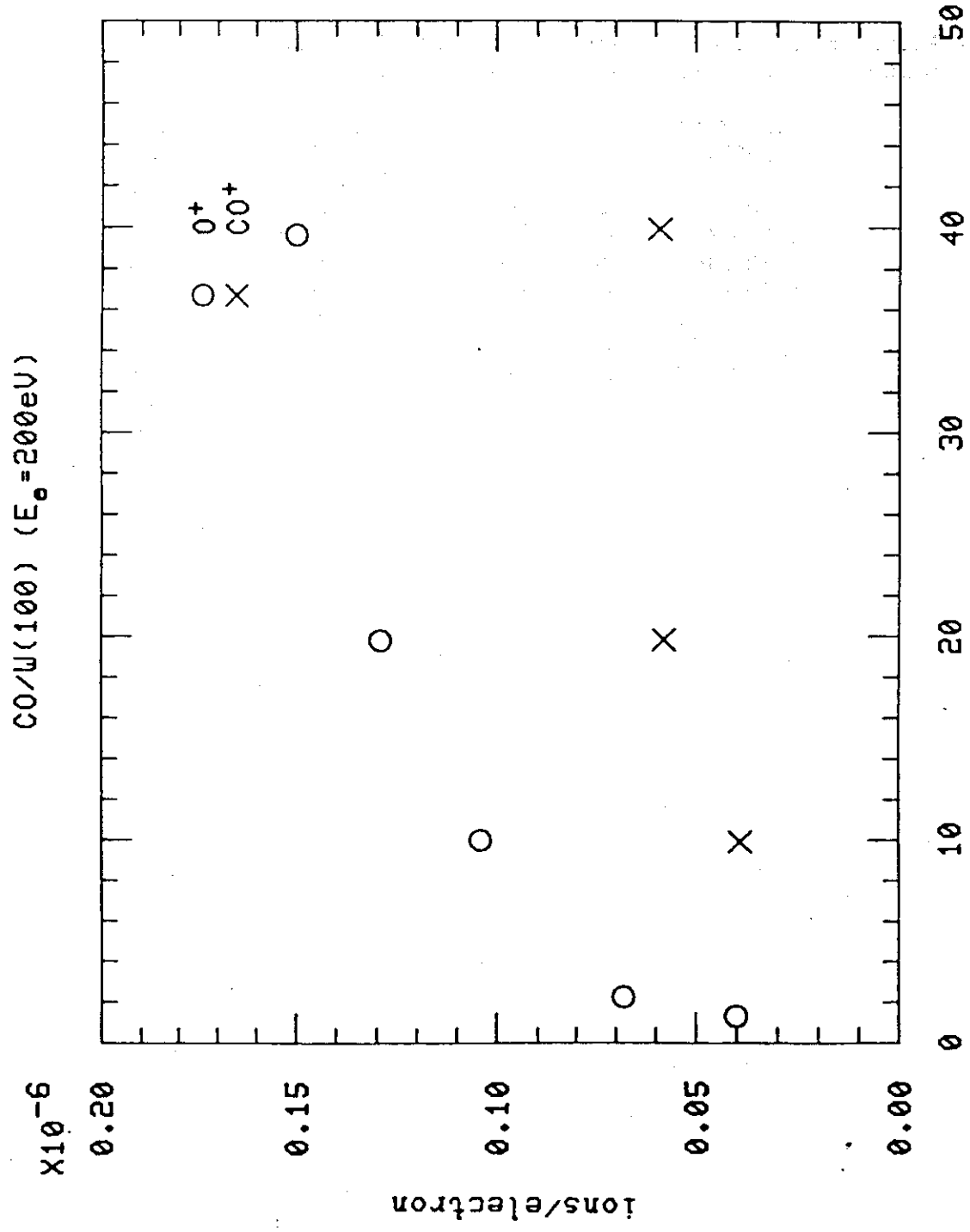

Fig.55 Desorption efficiency as a function of exposure

DATA LIST

Substrate	Adsorbed states	Incident energy(eV)	Temp. (K)	Desorbed species	Ions per electron	Ref.	Remark
100		0.200E+03	300	O+	0.401E-07	72As02	1.3L
100		0.200E+03	300	O+	0.681E-07	72As02	2.2L
200		0.200E+03	300	O+	0.104E-06	72As02	10.0L
100		0.200E+03	300	O+	0.129E-06	72As02	20.0L
100		0.200E+03	300	O+	0.150E-06	72As02	40.0L
200		0.200E+03	300	CO+	0.398E-07	72As02	10.0L
100		0.200E+03	300	CO+	0.579E-07	72As02	20.0L
100		0.200E+03	300	CO+	0.592E-07	72As02	40.0L

2.3.7 Lists for Miscellaneous Data

Note on Data List

T : temperature

E_e : incident electron energy

List for Miscellaneous Data

gas/solid	adsorbed state	E_e [eV]	T K	spec.	cross section total [cm^2]	cross section ion [cm^2]	ions, molecules per electron	remarks	ref.
CO/Al		100		CO	10^{-17} - 10^{-20}				68Ga02
CO/Ni(100)	Beta	100	300	O+		$4.0X10^{-21}$			79Ak01
CO/Cu		75		O+	$1.6X10^{-19}$		$5.0X10^{-5}$		67Da02
CO/Nb(111)		100	300	CO+,O+	$(4\pm1)X10^{-18}$				73Da01
CO/Ru		2500			$3.6X10^{-23}$			$CO_{ad} \rightarrow CO_g$ and $C_{ad}+O_g$	76Re08
CO/Ru		2500			$2.9X10^{-23}$			$CO_{ad} \rightarrow CO_g$	76Re08
CO/Ru		2500			$7.0X10^{-23}$			$CO_{ad} \rightarrow C_{ad}+O_g$	76Re08
CO/Ru(001)	Beta 2	110			$7.0X10^{-17}$				74Ma11
CO/Ru(101)		2500			$3.6X10^{-19}$				?
CO/Rh(110)		2500	300		$2.4X10^{-22}$			State 1→ State 2	77Ma21
CO/Rh(110)	II	2500			$1.1X10^{-22}$				77Ma21
CO/Ir(111)		2500	300		$1.0X10^{-17}$				78Sa01
CO/Ir(111)		86			$(0.8 \sim 1.7)X10^{-17}$				?
CO/Pt(110)		1500			10^{-18}				73La01
CO/Pt(111)		1500			$5.4X10^{-18}$				73La01
CO/Si(111)		100	300	CO+,O+		$4.35X10^{-20}$			78Dy01
CO/Si(111)		2500		O-				coadsorption O_2	74Ki04
CO/BeO		1200		CO+	$2.1X10^{-20}$				73Co04

List for Miscellaneous Data -CONTINUED

gas/solid	adsorbed state	E_e [eV]	T K	spec.	cross section total [cm^2]	cross section ion [cm^2]	ions, molecules per electron	remarks	ref.
CO/Al_2O_3		100	300	CO	$2.0X10^{-17}$				68Ga01
CO/Al_2O_3		100	300		$1.6X10^{-18}$				68Ga01
CO/Al_2O_3		100	300		$2.5X10^{-19}$				68Ga01
CO/Al_2O_3		100	300		$1.3X10^{-20}$				68Ga01
NO/Ni		100- 300	300			$1X10^{-24}$			80Sa06
NO/W		100	300		$2.5X10^{-19}$				67Ya01
NO/Pt(111)	Beta	2000	300		$1.4X10^{-18}$				76Co05
NO/Pt(111)	Beta	2000	300		$(4\pm2)X10^{-19}$			$NO_{ad} \rightarrow NO_g$	76Co05
NO/Pt(111)	Beta	2000	300		$(1\pm0.2)X10^{-18}$			$NO_{ad} \rightarrow N_{ad}+O_g$	76Co05
NO/Pt(111)	?	2000	300	N	$8.0X10^{-22}$			$N_{ad} \rightarrow N_g$	76Co05
NO/Pt(110)	?	2000	300		10^{-20}				76Co05
NO/Si		100- 500		O+			10^{-6}- 10^{-7}		75Ni09
H_2/Ni		100	303		$5X10^{-18}$			$P_{co} < 5X10^{-10}$ torr	71Wi01
H_2/Ni		100	303		$2X10^{-16}$			$P_{co} \sim 5X10^{-8}$ torr	71Wi01
$H_2/Ni(100)$		100	300	H+	10^{-18}			Incident angle 60°	68Li08
H_2/Mo		150		H_2	$2X10^{-17}$		$3X10^{-3}$		70Kl05
H_2/Mo		150		H+	$2X10^{-20}$		$3X10^{-6}$		70Kl05
H_2/C		85	300	H+		10^{-22}			69Da04

List for Miscellaneous Data -CONTINUED

gas/solid	adsorbed state	E_e [eV]	T K	spec.	cross section total [cm^2]	cross section ion [cm^2]	ions, molecules per electron	remarks	ref.
H_2O/Si(111)		100		H+			10^{-6}- 10^{-7}		75Ni09
N_2/W					$9.0X10^{-20}$				71Ma05
N_2/W	Alpha+Beta	100				$5X10^{-24}$	10^{-9}		70Ni03
NH_3/Mo		100	300-340	H+	$2X10^{-16}$			Coverage 150L	74Go05
NH_3/Mo		100	300-340	$^{15}NH+$	$4X10^{-18}$			Coverage 150L	74Go04
C_6H_{12}/Ru		150		$C_2H_3^+$	$2.8X10^{-17}$			Multilayer of C_6H_{12}	78Ma22
C_6H_{12}/Ru		150		$C_6H_{12}^+$	$2.2X10^{-17}$			Multilayer of C_6H_{12}	78Ma22
C_6H_{12}/Ru		150		H+	$1.0X10^{-16}$			Multilayer of C_6H_{12}	78Ma22
C_6H_{12}/Ru		150		H+	$(8\pm2)X10^{-17}$			Monolayer	78Ma22
H.C./Ru		150		H+	$2X10^{-17}$				78Ma22
C_6H_{12}/Ru					$8X10^{-17}$			Multilayer	78Ma22
C_3O_2/Pt		2500	300	O	$(2.9\pm0.2)X10^{-17}$				76Re09
C_3O_2/Pt		2500	300	C	$(4\pm0.3)X10^{-18}$				76Re09
C_3O_2/Pt		2500	300	O	$5X10^{-21}$				76Re09
diamond					$(5\pm2)X10^{-20}$			adsorbate; H_2S	77Lu01
HCl/Si(111)		100		O+,H+			10^{-6}- 10^{-7}		75Ni09

List for Miscellaneous Data -CONTINUED

gas/solid	adsorbed state	E_e [eV]	T K	spec.	cross section total [cm^2]	cross section ion [cm^2]	ions, molecules per electron	remarks	ref.
O_2/ Ti					10^{-18} - 10^{-19}				77Da10
O_2/ Nb		100	300	O+	$(1.5\pm0.5)X10^{-18}$		10^{-5}	full coverage	77Ag08
O_2/ Nb		100	300	O+	$(2.5\pm1.0)X10^{-19}$		10^{-9}		77Ag08
O_2/ Ta	1	100	300	O+	$(1.0\pm0.4)X10^{-18}$		$1.4X10^{-5}$		76Ag06
O_2/ Ta	2	100	300	O+	$(1.0\pm0.2)X10^{-19}$		$5.0X10^{-9}$		76Ag06
O_2/ Re		100		O+			10^{-9}		71Fo01
O_2/ Ir(111)	Beta 1	100		O+			$(1\pm0.4)X10^{-6}$		77Ag07
O_2/ Ir(111)		?			$7.0X10^{-19}$				?
O_2/ Pt	precursor	1000	300	O+	$1.5X10^{-16}$			recrystallized speciemen	81Cr04
O_2/ Pt	precursor	1000	350	O+	$1.3X10^{-16}$				81Cr04
O_2/ Pt	?	1000	350	O+	$7.1X10^{-18}$				81Cr04
O_2/ Pt	?	1000	950	O+	$7.8X10^{-18}$				81Cr04
O_2/ Si		2500		O-	$2.0X10^{-18}$			coadsorption CO	74Ki04
O_2/ Si		100-500					10^{-6} - 10^{-7}		75Ni09
O_2/ Si			300	O+		$1.0X10^{-21}$	$4.0X10^{-7}$		72Ni06
O_2/ Ge(111)		1500	300		$6.0X10^{-20}$			oxide	75Ma15
O_2/ C		75		O+		10^{-20}			69Da04
O_2/ C		85			$6.5X10^{-19}$				68Da03

List for Miscellaneous Data -CONTINUED

gas/solid	adsorbed state	E_c [eV]	T K	spec.	cross section total [cm^2]	cross section ion [cm^2]	ions, molecules per electron	remarks	ref.
CO_2/W	2			O+	$2X10^{-18}$	$1X10^{-21}$			71Ma05
CO_2/W	Beta			CO_2	$5X10^{-18}$				69Ag01
CO_2/W	I	100				$5X10^{-24}$			71Ni03
CO_2/W	II(Beta)	100		O+	$2X10^{-18}$	$1X10^{-21}$	$2X10^{-7}$		71Ni03
CO_2/W	II(Beta)	100		O			$4X10^{-4}$		71Ni03
TeO_2/Te		2000	300		$3.2X10^{-18}$			thickness 10.6 Å	78Mu03
TeO_2/Te		2000	300		$1.5X10^{-18}$			8.0 Å	78Mu03
TeO_2/Te		2000	300		$1.2X10^{-18}$			4.4 Å	78Mu03
R.G./glass		100-1040	300	O_2			10^{-6}		67Da03
R.G./CdS		4000-5000			$4X10^{-19}$ - $1X10^{-17}$				79La02
R.G./CdS		100			10^{-20} - 10^{-15}				77Dr02
R.G./Mo		100					10^{-5}		65Li01
R.G./Anode		90		O+			10^{-5}		60Yo01
Cs/W					$6X10^{-22}$				?
Cs/W		294			$6X10^{-21}$				68Be01
Hg/W		250			$1X10^{-20}$				68Be01
Xe/W(110)		200	27	Xe	$3X10^{-19}$ - 10^{-17}				81Zh01
Xe-O_2/W(110)		150	27	Xe	$1.2X10^{-15}$ - $1.1X10^{-14}$				81Zh01

List for Miscellaneous Data -CONTINUED

gas/solid	adsorbed state	E_e [eV]	T K	spec.	cross section total [cm^2]	cross section ion [cm^2]	ions, molecules per electron	remarks	ref.
Xe-CO/W(110)		150	27	Xe	$1.2X10^{-15}$				81Zh01
Xe/Ni,Pt		1000~3000	78		$1.0X10^{-17}$				75Ba03
Ba/W		200	300	Ba+	$1.0X10^{-19}$			State I → State II	76F101
Ba/W	II	200		Ba+	$6.0X10^{-20}$		$4.4X10^{-22}$		76F101
Ba/W		100			$2.0X10^{-22}$				?
Th/W					10^{-26}				?
F/W	I II	120	300	F+	$2.0X10^{-18}$				76F101
F/W	II	120	300	F+	$3.0X10^{-19}$				76F101
F/W	I II	120	1200	F+	$3.0X10^{-18}$				76F101
F/W	II	120	1200	F+	$3.0X10^{-19}$				76F101
Cs/GaAs(P)		100		Cs+	$2.0X10^{-18}$			(110) plane	71Ma04
Na/MgO		300	225,250	Na	$2.0X10^{-18}$			(001) plane	75Ja01

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[A]

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