JAEA-Data/Code 2014-001

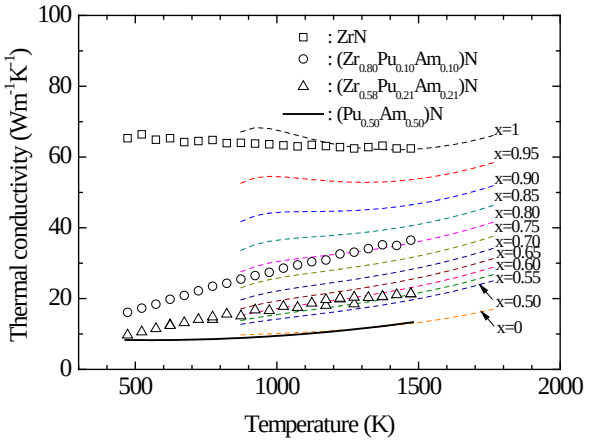
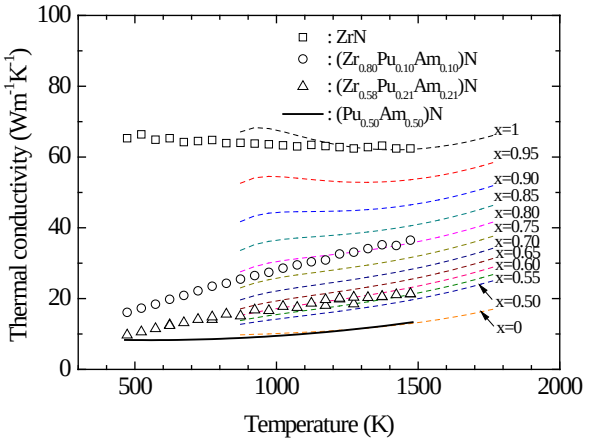
Property Database of TRU Nitride Fuel

TRU窒化物燃料物性データベース

List of errata

正誤表

<table>
<tr><th></th><th>Error（誤）</th><th>Correct（正）</th></tr>
<tr><td>p. 12</td><td>Table 2-3-1 Coefficients a, b and c in Eq. (2-3-7) for $(Zr_{0.61}Pu_{0.39})N$, $(Zr_{0.58}Pu_{0.21}Am_{0.21})N$ and $(Zr_{0.80}Pu_{0.10}Am_{0.10})N$
<table>
<tr><th></th><th>$(Zr_{0.61}Pu_{0.39})N$
$298 \leq T(K) \leq 1100$</th><th>$(Zr_{0.58}Pu_{0.21}Am_{0.21})N$
$298 \leq T(K) \leq 1082$</th><th>$(Zr_{0.80}Pu_{0.10}Am_{0.10})N$
$298 \leq T(K) \leq 1067$</th></tr>
<tr><td>a</td><td>8.8807×10^{-3}</td><td>7.6556×10^{-4}</td><td>1.2836×10^{-3}</td></tr>
<tr><td>b</td><td>8.8807</td><td>56.322</td><td>42.542</td></tr>
<tr><td>c</td><td>-</td><td>1.5865×10^{6}</td><td>6.6356×10^{5}</td></tr>
</table></td><td>Table 2-3-1 Coefficients a, b and c in Eq. (2-3-7) for $(Zr_{0.61}Pu_{0.39})N$, $(Zr_{0.58}Pu_{0.21}Am_{0.21})N$ and $(Zr_{0.80}Pu_{0.10}Am_{0.10})N$
<table>
<tr><th></th><th>$(Zr_{0.61}Pu_{0.39})N$
$298 \leq T(K) \leq 1100$</th><th>$(Zr_{0.58}Pu_{0.21}Am_{0.21})N$
$298 \leq T(K) \leq 1082$</th><th>$(Zr_{0.80}Pu_{0.10}Am_{0.10})N$
$298 \leq T(K) \leq 1067$</th></tr>
<tr><td>a</td><td>8.8807×10^{-3}</td><td>7.6556×10^{-4}</td><td>1.7236×10^{-2}</td></tr>
<tr><td>b</td><td>46.507</td><td>56.322</td><td>42.542</td></tr>
<tr><td>c</td><td>-</td><td>1.5865×10^{6}</td><td>6.6356×10^{5}</td></tr>
</table></td></tr>
<tr><td>p. 16</td><td>$F = 64.58 - 0.2235\ T - 0.0001812\ T^2 - 0.00000004654\ T^3$</td><td>$F = 64.58 - 0.2235\ T + 0.0001812\ T^2 - 0.00000004654\ T^3$</td></tr>
<tr><td>p. 17–18</td><td>The thermal conductivity of $(Zr_xPu_{(1-x)/2}Am_{(1-x)/2})N$ $(0.0 \leq x \leq 1.0)$ corrected for porosity to 100%TD is formulated by the following equation using the least squares method [26].
$K\ (Wm^{-1}K^{-1}) = A + B\exp(x/C)$ (2-4-4)
$A = 4.7624 + 1.3937\times10^{-2}\ T - 1.4543\times10^{-5}\ T^2 + 5.6365\times10^{-9}\ T^3$
$B = -0.15962 - 4.2325\times10^{-4}\ T + 9.1965\times10^{-7}\ T^2$
$C = -9.8103\times10^{-3} + 2.3662\times10^{-4}\ T - 3.2471\times10^{-8}\ T^2$
where x is the molar fraction of ZrN, and A, B and C are coefficients obtained by fitting. The temperature dependencies of the coefficients of A, B and C, obtained at each temperature above 873 K, are given as a polynomial equation of temperature. The predicted thermal conductivity of (Zr,Pu,Am)N is shown in Fig. 2-4-5. The uncertainty of</td><td>The thermal conductivity of $(Zr_xPu_{(1-x)/2}Am_{(1-x)/2})N$ $(0.0 \leq x \leq 1.0)$ corrected for porosity to 100%TD is formulated by the following equation using the least squares method [26].
$K\ (Wm^{-1}K^{-1}) = A + B\exp(x/C)$ (2-4-4-1)
$A = 4.7624 + 1.3937\times10^{-2}\ T - 1.4543\times10^{-5}\ T^2 + 5.6365\times10^{-9}\ T^3$
$B = -0.15962 - 4.2325\times10^{-4}\ T + 9.1965\times10^{-7}\ T^2$
$C = -9.8103\times10^{-3} + 2.3662\times10^{-4}\ T - 3.2471\times10^{-8}\ T^2$
where x is the molar fraction of ZrN, and A, B and C are coefficients obtained by fitting. The temperature dependencies of the coefficients of A, B and C, obtained at each temperature above 873 K, are given as a polynomial equation of temperature. The predicted thermal conductivity of (Zr,Pu,Am)N is shown in Fig. 2-4-5. The uncertainty of</td></tr>
</table>

	the thermal conductivities obtained by above equation is estimated as ± 15 %, from analytical and experimental errors.  Fig. 2-4-5 Predicted thermal conductivity of $(Zr_xPu_{(1-x)/2}Am_{(1-x)/2})N$	the thermal conductivities obtained by above equation is estimated as ± 15 %, from analytical and experimental errors.  Fig. 2-4-5-1 Predicted thermal conductivity of $(Zr_xPu_{(1-x)/2}Am_{(1-x)/2})N$ $873 \leq T(K) \leq 1673$ It is necessary to obtain the thermal conductivity above 473 K for the fuel design of ADS. Although the ZrN composition range is limited from 0.58 to 0.80, the thermal conductivity is expressed as the following equation. $K\ (Wm^{-1}K^{-1}) = D + E\ x \quad (2\text{-}4\text{-}4\text{-}2)$ $D = -4.766 - 2.718\times10^{-4}\ T - 6.115\times10^{-6}\ T^2$ $E = 8.558 + 0.04059\ T$ The temperature dependencies of the coefficients of D and E, obtained at each temperature above 473 K, are given as a polynomial equation of

temperature. The predicted thermal conductivity of (Zr,Pu,Am)N is shown in Fig. 2-4-5-2. The uncertainty of the thermal conductivities obtained by above equation is estimated as ± 10 %, from analytical and experimental errors.

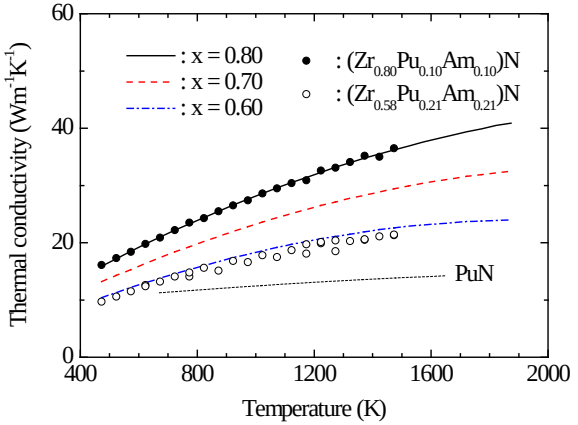


Fig. 2-4-5-2 Predicted thermal conductivity of $(Zr_xPu_{(1-x)/2}Am_{(1-x)/2})N$ $473 \leq T(K) \leq 1673$, $0.58 \leq x(mol\%) \leq 0.80$

p. 21

Table 2-4-6 Coefficients A, B, and C in Eq. (2-4-2) for $(Np_{1-x}Am_x)N$ and$(Pu_{1-x}Am_x)N$

	$(Np_{1-x}Am_x)N$			$(Pu_{1-x}Am_x)N$	
x	0.25	0.50	0.75	0.25	0.50
A	7.18	6.49	3.45	12.81	10.03
B	8.75×10^{-3}	5.49×10^{-3}	7.88×10^{-3}	8.16×10^{-3}	-6.39×10^{-3}
C	-1.90×10^{-6}	-6.07×10^{-7}	-1.47×10^{-6}	6.29×10^{-6}	5.82×10^{-6}

Table 2-4-6 Coefficients A, B, and C in Eq. (2-4-2) for $(Np_{1-x}Am_x)N$ and$(Pu_{1-x}Am_x)N$

	$(Np_{1-x}Am_x)N$			$(Pu_{1-x}Am_x)N$	
x	0.25	0.50	0.75	0.25	0.50
A	7.18	6.49	3.45	12.81	10.03
B	8.75×10^{-3}	5.49×10^{-3}	7.88×10^{-3}	-8.16×10^{-3}	-6.39×10^{-3}
C	-1.90×10^{-6}	-6.07×10^{-7}	-1.47×10^{-6}	6.29×10^{-6}	5.82×10^{-6}

p. 28	$\Delta_f G_{UN}$ (J/mol) = – 2.941×10^5 + 80.98 T – 0.04640 T^2 + 3.085×10^{-6} T^3 – 1.710×10^6 / T (298 < T(K) < 2628) (2-9-1) $\Delta_f G_{PuN}$ (J/mol) = – 3.384×10^5 + 152.0 T – 0.03146 T^2 – 5.998×10^{-6} T^3 + 6.844×10^6 / T (298 < T(K) < 3000) (2-9-3)	$\Delta_f G_{UN}$ (J/mol) = – 2.941×10^5 + 80.98 T – 0.004640 T^2 + 3.085×10^{-6} T^3 + 1.710×10^6 / T (298 < T(K) < 2628) (2-9-1) $\Delta_f G_{PuN}$ (J/mol) = – 3.384×10^5 + 152.0 T – 0.03146 T^2 + 5.998×10^{-6} T^3 + 6.844×10^6 / T (298 < T(K) < 3000) (2-9-3)