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The low-temperature heat capacity of $(U_{1-y}Am_y)O_{2-x}$ for y = 0.08 and 0.20

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Abstract

The low-temperature heat capacity of $(U_{1-y},Am_y)O_{2-x}$ solid solution with y= 0.0811 and 0.2005 and x = 0.01-0.03 was determined from a minimum of 12.52 K up to 297.1 K and from 9.77 K up to 302.3 K, respectively, using hybrid adiabatic relaxation calorimtry. The low temperature heat capacity results of the investigated system revealed the absence of the magnetic transition specific for UO_2 in the temperature region of 30 K. Since there are no experimental data available for AmO_2 in this temperature region, the results obtained for the intermediate compositions are validated based on the experimental data of UO_2 end-member and the low-temperature heat capacity computation of AmO_2. In the measured temperature interval, excess heat capacity was observed for the two investigated intermediate compositions, which is concluded to be dominated by self-radiation effects at very low temperature.

Key words: heat capacity, low temperature, calorimetry, actinide, oxides.

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