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TABLE I. Coefficients of thermal expansion (units of 10^{-6}/°C).

	α_{11}	α_{22}	α_{33}
U_2PtC_2	9.3±0.1		10.1±0.8
$UMoC_2$	8.6±0.2	15.5±0.5	9.9±2.6
UC_2	34.6±5.3		−8.4±0.9

(103) and (110) reflections of U_2PtC_2, and the (112), (311), and (223) of $UMoC_2$, these being the only well-resolved peaks free of interference from the graphite sample holder. While the standard deviations of the different lattice parameters range from 0.003 to 0.025 Å, they are constant with temperature. The data are from single-phase samples of approximately the stoichiometric composition.

Anisotropic coefficients of thermal expansion were obtained by least-squares analysis of the data. The results are shown in Table I, with values for UC_2 (tetragonal) derived from previous work.[6] Since the U_2PtC_2 and $UMoC_2$ data extrapolate to the measured room temperature lattice parameter values within twice the standard deviation, these results appear to be satisfactory from room temperature to the melting point. This extrapolation is not valid for UC_2, so the derived coefficients should be used only in the temperature range 1200°–1750°C where the data were taken.

* Work done under the auspices of the U.S. Atomic Energy Commission.

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Thermal Expansion of NbC, HfC, and TaC at High Temperatures

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The thermal expansion of niobium monocarbide, hafnium monocarbide, and tantalum monocarbide was determined from room temperature to 2700°C by dilatometric measurements. The apparatus and experimental procedure were described earlier by Miccioli and Shaffer.[1] All carbides used in the present investigation were prepared at The Carborundum Company by hot pressing at 3150°C and 3000 psi. The bulk thermal expansion results of these three monocarbides are compared with other published dilatometric data[1–3] and also with x-ray lattice expansion data.[4–6] The high-temperature divergence between the bulk thermal expansion data and the lattice expansion data is due to the effect of nonstoichiometry, caused by noncongruent vaporization[7–9] at high temperature in these cubic monocarbides. The previously reported inversion phenomena were observed in the vicinity of 2000°C on several refractory monocarbides which were prepared by hot pressing at about 2000°C. This inversion was not detected in the present investigation. The inversion is due to the densification at the temperature apparently at which the specimens were fabricated.

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