

Thermal expansion between 480 and 940 °C of Cr-doped mullites derived from single-phase precursors

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ABSTRACT

Thermal expansion of Cr-doped (0, 2.30, 4.74, 6.97, and 9.17 wt% Cr₂O₃) mullites derived from single-phase precursors was studied by in situ (480–940 °C) powder X-ray diffraction. Chromium doping caused an increase in unit-cell parameters. The strongest expansion due to Cr incorporation into mullite was noticed along the **c**-axis, followed by **a** and **b**. In the temperature range from 480 to 940 °C, the lattice parameters expanded almost linearly for all prepared mullite samples. Thermal expansion of Cr-doped mullite was smaller than of pure mullite. Both undoped and Cr-doped mullites displayed strongest thermal expansion along the **b**-axis, followed by **c** and **a**. Coefficients of thermal expansion along the **a**, **b**, and **c**-axes displayed minima for mullite doped with 6.97 wt% Cr₂O₃.

Keywords: Thermal expansion, Cr-doped mullite, X-ray diffraction, sol-gel