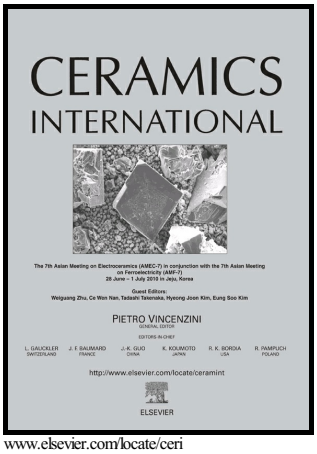

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Effect of Y doping on microstructure and thermophysical properties of yttria stabilized hafnia ceramics

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Abstract:

A series of Y_2O_3-doped HfO_2 ceramics ($Hf_{1-x}Y_xO_{2-0.5x}$, x=0, 0.04, 0.08, 0.12, 0.16 and 0.2) were synthesized by solid-state reaction at 1600 °C. The microstructure, thermophysical properties and phase stability were investigated. $Hf_{1-x}Y_xO_{2-0.5x}$ ceramics were comprised of monoclinic (M) phase and cubic (C) phase when Y^{3+} ion concentration ranged from 0.04 to 0.16. The thermal conductivity of $Hf_{1-x}Y_xO_{2-0.5x}$ ceramic decreased as Y^{3+} ion concentration increased and $Hf_{0.8}Y_{0.2}O_{1.9}$ ceramic revealed the lowest thermal conductivity of ~1.8 W/m*K at 1200 °C. The average thermal expansion coefficient (TEC) of $Hf_{1-x}Y_xO_{2-0.5x}$ between 200 °C and 1300 °C increased with the Y^{3+} ion concentration. $Hf_{0.8}Y_{0.2}O_{1.9}$ yielded the highest TEC of