

Enhancement of grain-boundary conduction in gadolinia-doped ceria by the scavenging of highly resistive siliceous phase

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The MgO was suggested as a new scavenger material to mitigate the harmful effect of SiO₂ impurity on grain-boundary conduction in 10mol% gadolinia-doped ceria (GDC). The grain-boundary conduction of GDC specimen containing 500 ppm of SiO₂ impurity increased up to ~45 times by the addition of 0.3 - 10 mol% of MgO. The solubility limit of MgO to GDC was as low as ~0.1 mol% and the most of MgO existed as a second phase. From the electron energy-loss spectroscopic analysis, the formation of forsterite(Mg₂SiO₄) or magnesium silicate oxides by the reaction between MgO second phase and siliceous intergranular phase was suggested as a scavenging mechanism.

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