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Influence of defect chemistry on microstructure evolution in CaTiO3

Microstructure plays a critical role in determining the performance of functional ceramics as the properties of grain boundaries can differ substantially from those of the bulk material. These differences often arise from the segregation of charged defect species during sintering. Such segregated defects form a space charge layer, impeding grain boundary motion due to reduced diffusion rates and applying a solute-drag force. The extent of defect segregation and its impact on microstructural and electrical properties depend on multiple factors, including the host material, sintering atmosphere (e.g. oxidizing vs reducing) and temperature, as well as the nature and concentration of dopant species present in the lattice.
In the present study, the defect chemistry of CaTiO3 was varied by introducing different dopants and sintering in different oxygen partial pressures. As such it is possible to investigate the influence of the defect chemistry on the grain boundary properties. The microstructural evolution and grain boundary mobility was investigated using scanning electron microscopy. Defect segregation, space charge and grain boundary mobilities were correlated by Electrochemical impedance spectroscopy measurements ,providing insights on the segregation behavior of different defects species in different sintering conditions and their impact on solute drag in CaTiO3.

Professional Status of the Speaker

Doctoral or Master Student

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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