

Transient chemistry evolution and defect formation in cold sintered dielectric ceramics

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The rapid technological advancement has increased the demand for high-performance electroceramics. While extensive efforts have focused on discovering alternative materials, it is increasingly recognized that innovative processing strategies can unlock the full potential of established material systems. In this context, the cold sintering process (CSP) has emerged as a transformative approach, enabling densification at low temperatures (<350°C) and opening new pathways for microstructural and grain boundaries design. CSP is driven by a chemo-mechanical mechanism activated by a compatible liquid phase under applied pressure. This talk highlights the effect of liquid phase chemistry and processing conditions on densification, microstructural evolution and the resulting mechanical and electrical properties of cold sintered dielectrics. Emphasis is placed on tooling effects, an often overlooked yet critical parameter governing transient chemistry during CSP. By comparing different die designs, the roles of pressure and temperature homogeneity as well as controlled liquid phase confinement through tailored die clearances and sealing conditions are elucidated. These factors provide access to control the kinetics of the transient liquid phase, which are shown to affect densification, defect chemistry, and ultimately functional response. The results demonstrate the central role of chemical effects and defect formation in CSP, offering insights for the design of reliable dielectrics.

Professional Status of the Speaker

Postdoc

Interest in submitting a paper in a special issue of

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Invitation letter for visa

No

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