Contribution ID: **163** Type: **2. Invited speaker (by invitation only)**

Sintering Dense Nanocrystalline 3 mol% Yttria Stabilized Zirconia by Leveraging Electric Field and Pressure Synergies

This study reports the successful fabrication of bulk nanocrystalline 3 mol% yttria-stabilized zirconia (3YSZ) from 60 nm powder, achieving a uniform grain size of 65 ± 20 nm via high-pressure-assisted spark plasma sintering (HP-SPS) at 1200 ℃ under 150 MPa. The densification mechanisms involve grain rotation, rearrangement, and plastic deformation driven by the synergistic effects of high pressure and electric fields. Additionally, this combination effectively inhibits grain coarsening. The resulting ceramics exhibit a microstructure characterized by low-energy, flat, and ultra-thin grain boundary as well as coincidence site lattice (CSL, Σ = 7), conferring exceptional mechanical properties, notably a flexural strength of 1703 ± 95 MPa and a Vickers hardness of 15.75 ± 0.79 GPa. This work significantly advances processing strategies for manufacturing dense nanocrystalline ceramics with precisely controlled microstructures.

Professional Status of the Speaker

Senior Scientist

Interest in submitting a paper in a special issue of

Journal of the European Ceramic Society (Elsevier)

Invitation letter for visa

Yes

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