Contribution ID: **48** Type: **2. Invited speaker (by invitation only)**

Densification and recycling of perovskite ceramics using chemical reactions in base solution

Tuesday, 1 September 2026 15:30 (30 minutes)

In recent years, interest has grown in low-temperature ceramic sintering and fabrication of multi-materials for various devices. We have developed an acid-base chemical densification (ABCD) process capable of producing dense ceramic bulk materials at temperatures below 200°C. This process applies the chemical reaction between metal oxide hydrous gels and alkaline hydroxide powders to nanoparticle synthesis and sintering. Utilizing highly reactive amorphous ZrO_2 gel as a raw material enables the application of the ABCD process to synthesize high-density bulk $BaZrO_3$, at the low temperatures of 100–150°C. Furthermore, observation of the internal structure of $BaZrO_3$ prepared by this method revealed that extremely fine nanograins aggregate to form domains constituting the bulk structure. When this bulk material is subjected to high-temperature treatment in a high-concentration barium hydroxide solution or in a strong basic solution without barium, a dissolution-precipitation reaction occurs. The material does not dissolve as ions but instead disperses as particles in the liquid. This process converts bulk $BaZrO_3$ into powdered $BaZrO_3$ rather than directly dissolving the bulk material. This could be useful for reusing $BaZrO_3$ after device fabrication, such as in fuel cells. This process demonstrates the potential for a novel recyclable method that controls both bulk formation and powderization using the same alkaline solution.

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

No

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