

Ceramic Shaping Using Colloidal Processing

Keywords : Electrophoretic deposition (EPD), Laminar composites

Back-ground

EPD, originally developed as a ceramics coating technology on electrically- conductive materials, has been promising for fabricating shape-controlled materials and laminar composites even on nonconductive surfaces.

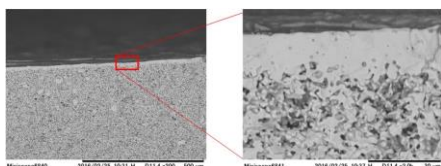
Aim

Improvement of EPD processing techniques enables the fabrication of various ceramic composites for functional and mechanical applications.

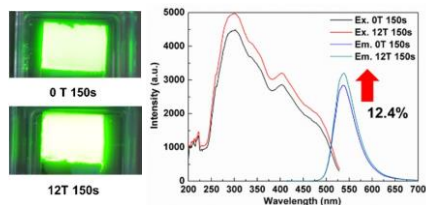
Advanced Research Topics



Direct shaping of Ceramics by EPD using conductive polymer-coated non-conductive ceramic substrates. This technique can be utilized for fabricating various shape-controlled ceramics, such as dental crown, by EPD technique.



Laminar structure of dense and porous oxide ion-electron mixed conductor layers for the use of oxygen separation membrane. Lamination of the layers by sequential EPD followed by co-sintering is a promising technique for reducing the cost and efforts for the processing of thickness-controlled laminar composites.



Improved photoluminescence (PL) property β -SiAlON:Eu²⁺ phosphor layer by EPD under 12T strong magnetic field. EPD in a strong magnetic field is a powerful method to fabricate crystalline-oriented ceramics layers, leading to enhanced functional performance.

Publications

- T. Kitabatake, T. Uchikoshi et al., J. Europ. Ceram. Soc., 32[7], 1365 (2012).
- C. Zhang, T. Uchikoshi et al., ECS J. Solid State Sci. Tech., 3[11] R195(2014).
- T. Uchikoshi and T. S. Suzuki., Ceramics 45[2], 88 (2010) .

Applied area and future prospects

- Suspensions optimized for EPD process
- EPD on non-conducting substrates
- EPD from aqueous suspensions
- Application for making laminar composites

Issues for technology transfer

- Shaping of tailor-made ceramics
- Uniform and ordered microstructures
- Improvement of ceramics properties
- Cost-effective process



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