

第290回応用セラミックス研究所講演会 開催のお知らせ

下記のとおり、応用セラミックス研究所講演会を開催いたします。
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日時 : 2015年6月10日(水) 14:00~15:00

場所 : R3棟1階 応セラ研会議室

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題目 : Field-assisted sintering/ Spark-Plasma Sintering of nanocrystalline ZnO
— Effect of bound water on diffusion, microstructure and defect stoichiometry —

The retention of nanocrystallinity in dense ceramic materials is still a challenge, even with the application of stress-assisted methods like Field-assisted Sintering Technology/ Spark-Plasma-Sintering (FAST/SPS). Interestingly, the combined effect of high heating rates and the presence of bound water significantly promoted densification of zinc oxide. In contrast, the sintering behavior of coarser powders is not affected by these conditions. Hence, sintering temperature could be decreased from 800 °C to 400 °C and dense nano-grained ZnO was synthesized. Furthermore, a high level of hydrogen doping is achieved by this methodology, causing this semiconductor to behave as a proton conductor.

EBSD and Rietveld refinement emphasize a high degree of crystalline texture, which develops out of isotropic powder particles during sintering. Moreover, the formation of a morphological anisotropy is observed in presence of bound water, which is attributed to the surface anisotropy of ZnO. The electrical analysis of the defect structure by impedance spectroscopy, photoluminescence and electron paramagnetic resonance spectroscopy provide valuable information about the origin of enhanced diffusivity, which is caused by hydroxide/ hydrogen related defects.

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