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S E M I N A R
on
Semiconductor Physics and Nanotechnology

Di, 17.02.2026, 13:00 Uhr,

Seminar in
person in the lecture hall Miller v. Hauenfels *or* via Zoom

"$BaTiO_3$ Nanoparticle-Derived Microstructures: Charge Separation, Sintering and Reactivity"

K. Neuhauser, G. Vives Ollé, K. Aicher, G. Bourret, G. Zickler, T. Berger, and O. Diwald

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Barium titanate, $BaTiO_3$, is an important material for research and industry.[1] It is widely used in multi-layer ceramic capacitors, and due to its outstanding ferroelectric properties, in random-access memories, sensors, or (photo)catalysts. In ceramics the tendency towards miniaturization requires an advanced understanding of property changes that occur while passing from coarse grained the nanosized systems. $BaTiO_3$ nanoparticles that are grown by gas phase synthesis are versatile building blocks for functional microstructures. The organization of the grains at different length scales determines function and performance.[1,2]

We investigated the influence of point defects and spontaneous polarization on $BaTiO_3$ nanoparticle powders that were grown by Flame Spray Pyrolysis.[3] In the next step, corresponding powders were used as starting material and as models to investigate grain growth and characterize the resulting microstructural changes on the surface and inside the nanoparticle layers. We have developed a new polymer-based flash annealing process to produce ceramic monoliths with graded microstructures. New types of surface nano- and microstructures, which originate from layered nanoparticle dispersions or nanoparticle compacts after uniaxial pressing, will be presented.

Microscopy and various spectroscopic techniques (EDX, Raman, UV-Vis Diffuse Reflectance) were used to characterize specific microstructural details of the sintered $BaTiO_3$ surfaces (local grain ensembles, pores, cracks, recrystallized areas, etc.) and to evaluate their influence on charge separation and reactivity towards H_2O, CO_2 and Ag deposition from aqueous solutions.

[1] Buscaglia, V.; Randall, C.A., J. Eur. Ceram. Soc. **40**, (2020) 3744; doi:10.1016/j.jeurceramsoc.2020.01.021;

[2] Diwald, O.; Berger T; Metal Oxide Nanoparticles: Formation, Functional Properties, and Interfaces, © 2022 John Wiley & Sons Ltd, DOI:10.1002/9781119436782,

[3] Neige, E.; Schwab, T.; Musso, M.; Berger, T.; Bourret, G., R.; Diwald, O.; Small, 19, (2023) 2206805; doi.org/10.1002/smll.202206805

Zoom – Link:
https://zoom.us/j/96375934537?pwd=RTlKTWhSdzRHU211YTY1bGFxTUtpZz09
Meeting-ID: 963 7593 4537
Kenncode: =r=4YQ