Motion control of nano/micro sized ceramics by nano second pulse field

This study aims to elucidate the mechanism of driving nano/micro dielectric ceramics particles under the nano second pulse or DC electric field. The microstructure driving is affected by various electrical phenomena occurring at the same time such as surface potential, polarization, and electrostatic force. It makes the challenge to clarify the driving mechanism. A simple experimental system was used to observe the behavior of the ceramics nano particles and spherical micro ZrO₂ particles in a nonaqueous solution under the electric field. The results suggested that the driving mechanism of the ceramics nano particles and ZrO₂ particles under electric field was created by the combination of the electric image force, the gradient force and the contact charging phenomenon. We thus propose a method to control the micro/nano structure by using this motion control mechanism in further studies and application.

Recent Publications

2. Superconducting water derivatives of Sr₂Caₙ₋₃CuₙO₄₋₂₋₂₃₋₂ (n = 2-4) high-Tc superconductors, Materials Chemistry and Physics, Volume 177, 1, Pages 67-72 (2016).
3. Insulating polymer nanocomposites with high-thermal-conduction routes via linear densely packed boron nitride nanosheets, Composites Science and Technology, Volume 129, 6, Pages 205-213 (2016).
Biography

Tadachika Nakayama is a Professor in the Department of Science of Technology Innovation at Nagaoka University of Technology (NUT), Japan. He received his Ph.D. (2000) in Applied Chemistry from Osaka University, Japan, and obtained M.S. (1997) and B.S. (1995) degrees in Material Science from Osaka Prefecture University, Japan. He is winner of the Advancements in ceramic science and technology from Ceramics Society of Japan (2008), the Global Star Award from ACerS Engineering Ceramic Division (2016), and The Commendation for Science and Technology by the Minister of Education Culture, Sports, Science and Technology (MEXT, Japan) (2016). He is a member of the ACerS Engineering Ceramic Division. He is the pioneer in the Nano Structured Ceramics and its Processing with Nano Pulsed Power Technology. He is the developer of new material design of ceramics/polymer hybrid nanostructured materials for thermal management, sensor and energy harvester application.

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