

World Summit on

Emerging Materials and Nanotechnology

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Possible Continuous (Successive) Fabrication of Nano-Structured Inorganic Materials via Soft Solution Processing without Firing

Practical devices would be better to be fabricated via continuous and/or successive Processes. Presently, however, they have generally been fabricated artificially and/or industrially by so-called high-technology, where high temperature, high pressure, vacuum, molecule, atom, ion, plasma, etc. using expensive equipment's thus they consumed huge amount of resources and energies thus exhausted huge amounts of wastes: materials, heats and entropy. The major reasons might be 1) The reactants should be Nano-sized species, 2) high-energy reaction might be required, thus 3) They cost economically and environmentally. To save this tragedy, a) we must consider "Cascade use of Heats", and b) "Low energy Production of advanced materials via solution-based technologies." c) Continuous (Successive) Fabrication will be possible in solution process(es).

We proposed in 1995 an innovative concept and technology, "Soft Processing" or "Soft Solution Processing," which aims low energetic (=environmentally friendly) fabrication of shaped, sized, located, and oriented inorganic materials in/from solutions. When we have activated/stimulated interfacial reactions locally and/or moved the reaction point dynamically, we can get patterned ceramic films directly in solution without any firing, masking nor etching. Direct Patterning of CdS, PbS and CaWO₄ on papers by Ink-Jet Reaction method. Furthermore, we have succeeded to fabricate BaTiO₃ patterns on Ti by a laser beam scanning and carbon patterns on Si by plasma using a needle electrode scanning directly in solutions. Successes in TiO₂ and CeO₂ patterns by Ink-Jet Deposition, where Nano-particles are nucleated and grown successively on the surface of substrate thus become dense even below 300 C will be presented.



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Biography

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