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## The Utility of Low T and Anisotropically Driven Fabrication in Morphologically-Biased Functionality in *Nano*-Ceramics

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The emergence of many new fabrication methodologies in the past 20 years has given rise to a plethora of ceramic nano-materials with exotic new properties that are clearly distinguished from the same materials produced by traditional, bulk processes. Nearly all are attributed to nanoscaled complex physical structures that evolve through some sort of starkly nonequilibrium, high driving force process that cannot be contained in one-dimensional action. A common thread to all of these processes is that they take place at low temperatures, where the chemical, electrical and mechanical driving forces are seemly enhanced. Common relationships between reactions driven at low temperature and morphology are examined for several very different cases carried out in our laboratory. These include (i) the electrochemical etching of titania nanotubes used for chemical sensor platforms, (ii) the growth of semiconducting silicon nanowires in plasma-emersion CVD, (iii) the aqueous deposition of nano-ferrite thick films where the magnetic domains are decoupled from the physical nanostructure, and (iv) the simultaneous formation and self-assemblage of magnetic nanoparticles into 1D, 2D and 3D superstructures at the micron scale.

### Biography:

William T. Petuskey is Professor in the School of Molecular Science at Arizona State University and Director of ASU's Advanced Materials Initiative. He received his Sc.D. in materials science at the Massachusetts Institute of Technology. He served as chairman of ASU's Department of Chemistry and Biochemistry and Associate Vice President of Science, Engineering and Technology (in the university's central research office of Knowledge Enterprise Development). His research activities are devoted to the synthesis and physical chemistry of nano-scaled ceramics, and enabling ASU's materials research community through strategic teaming, infrastructure development and operational analytics.

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