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Editorial

Engineering Nanostructures of Inorganic Materials for Optical and Chemical Applications

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Considerable interest is being exhibited in the novel and enhanced properties of nanostructured materials. These materials, with their constituent phase or grain structures modulated on a length scale of less than 100 nm, are now artificially synthesized by a wide variety of physical, chemical, and mechanical methods. Today, scientists and engineers have access to a wealth of technologies such as self-assembly, chemical template, electron-beam lithography, focused-ion-beam (FIB) lithography, nanoimprint, nanomolding, and scanning-probe lithography to build nanostructures at unprecedented scales, resolution, and throughput. The art of developing functionalized nanostructured materials exploiting unusual interfacial properties seems to have produced hitherto unknown man-made materials. Exploitations of nanostructured metal and oxide materials with many excited optical, chemical, and mechanical properties will lead to the broad range of potential applications including catalyst, drug discovery, sensing, nanoimaging, spectroscopy, optoelectronics, data storage, and structured-materials with enhanced mechanical properties.

In this special issue, a series of contributed papers is focused on the function-motivated nanostructure design, fabrication, characterization, and application including metal, oxide, and ceramics. A wide range of recent progress on the chemical and physical fabrication methods of metal nanostructures, their optical properties, and application has been reviewed by G. Kawamura's and Y. Yang's groups. C. T. Torres et al. reported the transmittance modulation of optical signals in a nanocomposite integrated by two different silver doped zinc oxide thin solid films. T. K. Lee et al. reported polyol-free synthesis of highly loaded Pt catalysts on sulfuric-acid-treated graphene oxide (SGO) and their catalytic properties. Y. H. Lin's group reported Fe-doped NiO nanofibers synthesized by electrospinning method and studied their ferromagnetic behaviors. The surface modification of SiC ceramics and the optical application have been reviewed by F. Jiang. The nanostructures of Si, GaN, and TiO_2 and their optical-electric properties were studied by D. Li et al., S. P. Chang et al., and L. Cheng et al., respectively. Kasuga's group demonstrated aluminum silicate nanotube coating of siloxane-poly (lactic acid)-vaterite composite fibermats by electrospinning. This approach may provide a new method of improving the surface of polymer-based biomaterials.

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