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Special issue on nanoscale assembly and integration for applications

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Editorial

Special Issue on Nanoscale Assembly and Integration for Applications

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The field of nanoscale science and technology has grown rapidly in the past few decades and now plays an important role in many areas, from fundamental scientific research to current and emerging applications in electronics, computing, biotechnology, energy and composite materials. Nanoscale structures are typically defined as having dimensions between approximately 1 and 100 nm. At these length scales, the physical and chemical properties of materials begin to emerge and provide a fertile ground for novel science and engineering to enhance the performance of existing technology and create new applications with unique functions.

This Special Issue highlights advances in the assembly and integration of nanoscale structures for next-generation technology in a broad range of fields, including electrochemistry, thin-film semiconductors, sensors and protein biomarkers.

Patella et al. [1] report on nanochannel anodic alumina membranes and the effect of electrolyte composition on channel morphology for use as a template to fabricate PdCo alloy nanowires that could be useful for catalysis and hydrogen fuel production. Ohta et al. [2] describe the fabrication and properties of nanocrystalline ZnTe thin films and nanowire arrays for applications in electronics and photovoltaics. Orus et al. [3] present results for the focused ion beam-induced deposition of nanowire patterns that utilize a cooling thermoelectric plate to reduce the processing time during the nanofabrication of nanostructures and devices. Sapkota et al. [4] present the use of planetary ball-milled ZnO nanoparticle inks for the creation of inexpensive thin film gas sensors that operate at room temperature and can detect different target species including hydrogen and methane. Neupane et al. [5] give a comprehensive review of different biomarker assays employing aptamers, antibodies and nanomaterials for sensitive diagnostics and disease detection.

While this Special Issue is now closed for new submissions, important challenges regarding the control and integration of structures as desired in order to deliver novel materials and applications at the nanoscale continue to be actively investigated—By controllably assembling nanomaterials, their excellent properties can be harnessed for applications in information technology, sustainability, health and security.

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