

## I. Science & Technology for Interfacing to the Nanoscale

### (B) Interface Properties in Micro-to-Macro Building-Blocks

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This session will focus on the interface properties when nanodevices are used as building blocks to make up subsystems and systems? Here, the primary issues relate to integration as nanodevices are evolving to produce micro and macro systems. Important questions to be addressed include: how does one deal with interfaces between nano and micro devices; how do the interfacial properties change when nanodevices are integrated; and, how well we preserve the nano-properties in integration?

#### Specific Areas of Emphasis:

- Novel properties of nanostructured assemblies (that arises from assembly as opposed to individual nanostructures, or bulk forms).
- Scalable processing and patterning approaches (bottom-up and top-down) across multiple length scales and dimensions (2D-3D).
- Mesoscale crystals comprised of nanostructures and/or pores (e.g., crystals made of semiconductor nanoparticles, materials made of highly ordered pores; e.g., for photonic or sensing devices, metamaterials etc.).
- Novel approaches to patterning and assembly of multiple/disparate materials.
- Techniques to create meso-scale assemblies
  - Controlling 2 and 3 dimensional placement, alignment, orientation and configuration of nano-units
  - Directed deposition and growth of multidimensional mesostructures
  - Bio-inspired and bio-assisted assembly
  - Nanomanipulation and writing with particle/optical beams and probes
  - DNA and protein defined assemblies
  - Junction formation
  - Strategies for preserving and tuning properties in assemblies
  - Novel nanounit assembly techniques
  - Synergistic manifestation of novel properties.
  - Predicting properties in assemblies (first-principles, molecular dynamics, Monte-Carlo, etc.)
  - Electronic, optical, chemical, magnetic, thermal and mechanical properties
  - Mesoscale assemblies for computation, sensing, separation and recognition
  - Exposition of novel applications and device concepts using mesoscale assemblies