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"Bottom up" approach to nano probe fabrication and study of graphene and carbon nanotubes

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Carbon nanotubes (CNTs) and graphene are considered as prime materials for nanometer-scale science and technology due to their unique and superior combination of electrical, thermal, optical and mechanical properties. This has inspired a widespread effort to develop CNTs and graphene based applications for next generation nanoelectronics. The practical realization of CNT and graphene technology depends critically on whether CNTs can be formed in a controlled manner and if graphene can be produced, modified and patterned into various predesigned architectures in planar (2D) or three dimensional layouts.

Incorporating of the single walled carbon nanotubes (SWNTs) or graphene into various architectures compatible with current technologies often require combination of novel and conventional methods of nanofabrication. For example, precision patterning of catalysts, and preferential growth of SWNTs with well-defined characteristics is one of the most important problems that require further exploration. I will briefly discuss current working metrologies for CNTs fabrication and present our studies based on novel method of preparation of CNTs assemblies using scanning probe based parallel patterning technique employing molecular catalysts. I will share our current progress in employing scanning probe metrology for graphene surface modifications and graphene substrate patterning experiments.

Mask free patterning technique can be employed to build nanometer-scale structures and patterns by "writing" many materials directly on substrate surfaces with resolutions ranging from micrometers down to nanometers, virtually on any substrate material. This approach enables nanoscale precision and high throughput individual addressability for further investigations of different architectures that could be applicable to variety of materials.

Biography

Irma Kuljanishvili, has received her PhD from Michigan State University, and conducted her Postdoctoral work at Harvard and Northwestern University. She is currently an Assistant Professor at Saint Louis University, Department of Physics. Her work is focused on applied physics, nanomaterial and nanotechnology with emphasis on developing novel techniques for synthesis, characterization and measurements of low dimensional (1D and 2D) systems and devices. Dr. Kuljanishvili's published work has received recognition in scientific journals such as Nature Physics, Small, NanoLetters etc.

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