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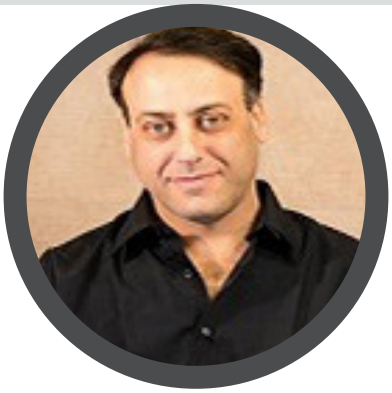
DIVERSIFICATION OF NANOWIRE BUILDING BLOCKS BY POST-SYNTHESIS MODIFICATIONS; MONOLAYER DOPING AND SELF-PROCESSING SYNTHESIS



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Programmable introduction of heterogeneity at the nanoscale plays a key role in the design of functional building blocks for catalysis, electronic devices, and numerous other applications. Synthetic strategies for attaining well-defined heterogeneity in structure, shape, composition and modulation of the electronic structure at selected regions of the nano system is therefore highly desired. I will present our research towards two methodologies for post-synthesis modification and symmetry breaking of semiconducting nanostructures using nanowires as the basic building blocks covering two aspects of post-synthesis modification of nanowires: (I) *Ex-situ* doping of silicon nanowires. *Ex-situ* doping enables the transformation of un-doped silicon nanowires into heterogeneously doped building blocks featuring sharp p-i-n junctions across the nanowire. Relying on surface chemistry provides an accurate dose and initial positioning together with fine control over the diffusion processes. The monolayer doping methodologies are valuable for decoupling the doping step from the nanowire synthesis step, resulting in *ex-situ* doping. (II) Self-processing synthesis of coinage metal-semiconductor hybrid structures. The hybrid nanostructures obtained for the coinage metals resemble the morphology of grass flowers, termed Nano-floret hybrid nanostructures consisting of a high aspect ratio SiGe nanowire (NW) with a metallic nanoshell cap. The new class of structures is useful in a variety of applications owing to the unique geometrical aspect ratio and electronic properties of the hybrid systems. The synthesis involves a sequence of selective etch and deposition steps which are self-initiated and self-terminated resulting in the hybrid nanostructures

Biography

Roie Yerushalmi has received his PhD in Chemistry from the Weizmann institute of science, Israel, in 2005 (awarded the Kennedy prize for outstanding PhD work). He pursued Postdoc in the field of Nanoscience in the lab of Prof Ali Javey at UC Berkeley from 2006-2008. In 2008, he joined the Institute Of Chemistry at the Hebrew University of Jerusalem, Israel. He is serving as an Associate Professor at the Hebrew University of Jerusalem, since 2015. His main research interests include development of new surface chemistries, atomic and molecular layer deposition, nanowire synthesis methodologies, hybrid nanostructures, ex-situ doping of nanostructures, nanostructure array assembly, and comprehensive characterization of complex nanostructured systems by application of analytical methods. Design and synthesis of hybrid nanostructures for photocatalysis, electrical and optical applications, energy harvesting. He has received a starting grant from the ERC (European Research Council), the Krill Prize, Kennedy prize, and the career development award by the Human Frontier Science Program.

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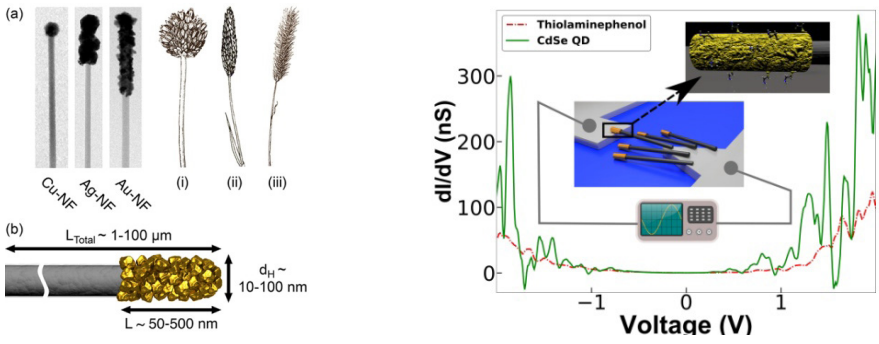

Figure 1: **Nanoflora, hybrid nanostructures based on nanowire building blocks used for sensing.**