



University of Crete
Department of Physics

40 Years Anniversary Colloquium Series

Thursday, 8 November 2018 | 17:00 – 18:00, Seminar Room, 3rd floor

III-As nanowires: New potentials for an old semiconductor

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ABSTRACT

After more than fifty years of fruitful research, III-As semiconductors have stimulated many breakthroughs in physics and thin-film technology. The reason is their direct band gap and high electron mobility, as well as the possibility to tailor their electronic properties using (qua-) ternary alloys with appropriately selected chemical compositions. More recently, III-As semiconductors in the form of free-standing nanowires have exhibited new potentials for a wide variety of future applications in nanotechnology, ranging from energy-efficient electronic switches to entangled-photon-pair sources for quantum information technology, including the possibility for monolithic integration in the mainstream Si technology. In this colloquium, I will first describe the bottom-up fabrication of GaAs nanowires on Si substrates using the very special self-catalyzed vapor-liquid-solid growth mode. The second part will be devoted to nanowires with lattice-mismatched GaAs/(In,Ga,Al)As core/shell heterostructures and the unique possibilities for strain-engineering therein. Under specific conditions, the electronic properties of the core can be strongly modified, rendering GaAs nanowires suitable for photonic devices across the whole near-infrared (IR-A) range or high-speed transistors, all integrated in Si-CMOS chips.