NANO Colloquia 2020 in streaming
Thursday 21 May 2020 - **11:00**

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Speaker
Sedighe Salimian (NEST, NANO-CNR)

Title:
"Quantum transport in dual-channel InAs/InP/GaAsSb core-shell nanoscale devices and Graphene/ultrathin-Si_3N_4 heterostructure device"

Abstract:

In this talk I will present two topics linked in investigating quantum transport of Nanoheterostructures. Development of new III-V heterostructures drives engineering multifunctional devices in order to open the way to study rich physics phenomena such as Coulomb drag in low dimensions as well as the detection of indirect excitons. Recently, a strong and tunable band to band tunneling was demonstrated in InAs/GaSb core-shell NWs embedding a radial broken-gap heterojuction [1]. Therefore, implementing a thin insulator to such a system can control two closely-spaced, but electrically-separated regions hosting electrons and holes on a new core-dual shell InAs/InP/GaAsSb nanowires [2]. In this talk, our experimental findings [3] indicate a promising nanoscale system for the investigation of the coexistence of electrons and holes and of their Coulomb pairing.

In the second part of my talk, I would describe the first experimental study of graphene/Ultrathin-Si_3N_4 heterostructure. In this study [4], a quantitative understanding of the performance of ultrathin β-Si_3N_4 as a new alternative high-k gate dielectric, with small lattice mismatch with graphene, is provided.

Refs:
[1] M. Rocci, et al., Tunable Esaki effect in catalyst-free InAs/GaSb core-shell nanowires, Nano Letters 16, 7950-7955 (2016).
[2] O. Arif, et al., Growth and Strain Relaxation Mechanisms of InAs/InP/GaAsSb Core Dual-Shell Nanowires, Crystal Growth&Design 20, 1088-1096 (2020).
[3] S. Salimian, et al., Electrical probing of carrier separation in InAs/InP/GaAsSb core-dualshell nanowires, Nanoresarch 13, 1065-1070 (2020).
[4] S. Salimian. et al., Morphology and magneto-transport in exfoliated graphene on ultrathin crystalline β-Si_3N_4(0001)/Si(111), Advanced Materials Interfaces, 1902175 (2020).

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