NSERC CREATE **TOP-SET** Un programme *FONCER* du CRSNG

Séminaire

Le mardi 16 octobre 2018, 15h
Des rafraîchissements seront servis dès 14h30
Complexe de recherche avancée, pièce 233
Université d'Ottawa, 25, rue Templeton
Le séminaire se déroulera en anglais.

Seminar

Tuesday, October 16, 2018, 3 p.m.
Refreshments served at 2:30 p.m.
Advanced Research Complex, room 233
University of Ottawa, 25 Templeton Street

Antimonide-based membranes: Synthesis, integration, and strain-engineering

Marziyeh Zamiri, private consultant

Abstract: Despite the numerous demonstrations of III-V semiconductor membranes, Sb-based heterostructures have not been isolated from their epitaxial growth substrate. Here, we will discuss a few examples to illustrate the technological value of Sb-based membranes in the field of infrared imaging and microelectronics. We will demonstrate a versatile release and transfer technique, which enables integration of any Sb-based heterostructure with a variety of hosts, including Si, polydimethylsiloxane and metal coated substrates. Our approach is based on capping the surface as well as the sidewalls of the membrane during release. Electron microscopy shows structural integrity of transferred membranes with thickness of 100 nm to 2.5 µm and lateral sizes from 24×24 µm^2 to 1×1 cm^2. Atomic force and electron microscopy reveal the excellent quality of the membrane interface with the new host. The crystalline structure of the membrane is not altered by the fabrication process, and a minimal elastic relaxation occurs during the release step, as demonstrated by X-ray diffraction and mechanical modeling. A method to engineer strain in Sb compounds by bending is theoretically illustrated. Continuum elasticity theory shows that up to ~3.5% compressive strain can be induced in an InSb quantum well through external bending. Photoluminescence spectroscopy and characterization of an infrared photodetector based on InAs/InAsSb bonded to Si demonstrate the functionality of transferred membranes in the infrared range.

Bio: Marziyeh Zamiri received her Bachelor degree in Electrical Engineering with major in communication from Isfahan University of Technology (Iran) in 2005. Later, she passed a three-year Master's program at the Laser and Plasma Institute (Tehran, Iran) in 2009. Her master's project was on the influence of electrical conductive cap layer on magneto-impedance effect in amorphous magnetic materials. She moved to the U.S. in 2010 and joined the Helmerich Research Center (Tulsa, Oklahoma) as a research assistant. Her short term project was about amorphous-crystalline nanocomposites for thermoelectric application. After a year, she joined the Center for High Technology Materials at the University of New Mexico where her research focus was on semiconductor (group III-V) optoelectronic devices, photodetector and laser fabrication, electrical and optical characterization. In December 2016 she finished her PhD and moved to the University of Wisconsin-Madison as a postdoctoral research associate. In Madison, she was involved mostly in group IV optoelectronic device fabrication and characterization and she also became an expert in material characterizations (SEM, EDS, XPS, and etc). Dr. Zamiri has published two U.S. patents and over 15 journal and conference papers.

TOP-SET est un programme de formation FONCER du CRSNG en puissance optoélectronique ayant pour but de façonner une cohorte de personnel hautement qualifié détenant des connaissances approfondies en systèmes optoélectroniques pour joindre les rangs d'équipes de recherche et développement.

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NSERC CREATE Training in Optoelectronics for Power: from Science and Engineering to Technology (**TOP-SET**) is a training program that aims to form a cohort of highly qualified personnel with comprehensive understanding of optoelectronic systems, capable of joining advanced R&D teams.

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Le financement pour TOP-SET est fourni par le Conseil de recherches en sciences naturelles et génie.
TOP-SET is funded by the Natural Sciences and Engineering Research Council of Canada.

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Le financement pour ce séminaire est fourni par l'Université d'Ottawa.
This seminar is funded by the University of Ottawa.