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**DS 4: Invited Ning**

Time: Monday 10:15–11:00

Location: GER 38

**Invited Talk** DS 4.1 Mon 10:15 GER 38  
**Semiconductor Nanolasers with Nanowire and Plasmonic Waveguides** — •CUN-ZHENG NING — Center for Nanophotonics at Arizona Institute of NanoElectronics and Department of Electrical Engineering, Arizona State University

This talk presents theoretical aspects of a nanolaser made of semiconductor nanowire or nano pillar. A semiconductor nanowire or nanopillar is a unique nanolaser structure since it serves both as a gain material and a waveguide of high index contrast at the same time. Due to the small size and high index contrast, nanowire lasers show many features that are distinct from those of a conventional laser. These include

strongly size and frequency dependent cavity loss, large confinement factor, diverging beam profile, and large spontaneous emission factor. To reduce the size of nanowire laser further, we exploit the possibility of coating a nanowire with a metal, thus forming a surface plasmonic waveguide. We will show that, despite the well-known large metal loss, it is possible to have a metal-coated nanowire to have large enough modal gain to exceed the necessary threshold, leading to our prediction of the first surface-plasmonic semiconductor nanolaser. Recent experimental work on this type of lasers will be presented and compared with the theoretical results, showing the first possible evidence of lasing in a surface-plasmonic waveguide.