

# International Conference and Exhibition on Mesoscopic & Condensed Matter Physics

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## ZnO nanostructures and memristors

Zinc oxide (ZnO) is a unique wide bandgap biocompatible material system exhibiting both semiconducting and piezoelectric properties that grows in a diverse group of nanostructure morphologies. Bulk ZnO has a bandgap of 3.37 eV that corresponds to emissions in the ultraviolet (UV) spectral band. Highly ordered vertical arrays of ZnO nanowires (NWs) have been grown on substrates including silicon, SiO<sub>2</sub>, GaN, and sapphire using a metal organic chemical vapor deposition (MOCVD) growth process. Co-axial core-shell nanostructures demonstrating unique properties with enhanced detectability of chemical species have been grown. Structural and optical properties of the grown vertically aligned ZnO NW arrays characterized by scanning electron microscopy (SEM), X-ray diffraction (XRD), and photoluminescence (PL) will be presented and discussed. We will introduce the growth of horizontal ZnO nanowires and present the state-of-the-art technology in the fabrication of memristors – the fourth circuit element. A discussion on the operation of memristors using the concept of conductive filament formation supported by both measurement of I-V and modeling will follow.

## Biography

Mehdi Anwar is currently working on (a) ZnO Nanowire based UV detection and energy harvesting, (b) III-Nitrides and Oxide Semiconductor -based high power and high temperature quantum cascade lasers and (c) RF Oxide Semiconductor and III-Nitride HFETs and (d) memristors, to name a few. His team pioneered the design of low noise antimony-based-compound-semiconductor (ABCS) HEMTs with quaternary buffer/barrier and ternary, with a measured fT around 200FGHz and Fmin of 0.82dB at 15GHz. He has presented over 40 plenary and invited talks at national/international conferences, published over 240 archival journal publications, conference proceedings and book chapters and edited 9 volumes. He serves as an Editor of *IEEE JEDS* and served as an Editor of the *IEEE Transactions on Electron Devices* (2001 – 2010) and serves as the conference chair of the international conference on Terahertz Physics, Devices and Systems, at SPIE Defense, Security and Sensing (2009-2015). He is an SPIE Fellow.

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