



**Southeastern Michigan Section  
"Chapter IV" Speaker Series  
Wed., March 24, 2010, 4:30 pm  
Appetizers and Networking at 4:00 pm  
Room #1010, Dow Bldg,  
North Campus, University of Michigan  
2300 Hayward St., Ann Arbor, MI**



## **"Single-Material MEMS Using Micro and Nano Diamond Films"**

**Prof. Dean Aslam**

Associate Professor of Electrical and Computer Engineering  
Michigan State University, East Lansing, MI

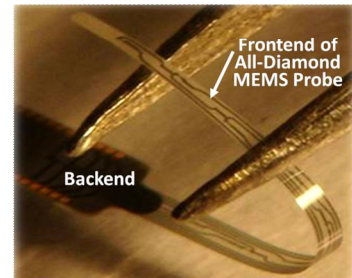
Associate VP Americas of MANCEF ([www.mancef.org/AboutMANCEF](http://www.mancef.org/AboutMANCEF))

Assoc. Director of NSF WIMS ERC ([www.wimserc.org](http://www.wimserc.org))

Founding Editor-in-Chief of Journal of Nanosystems and Technology

### **Abstract:**

Conventional Micro Electro Mechanical System (MEMS) or Microsystems are typically fabricated using semiconductors, metals and insulators. Large band gap materials such as diamond ( $E_g = 5.5$  eV) and AlN (6 eV) offer the possibility of making MEMS structures out of a single material by varying the doping level to achieve films with semi-conducting, metallic and insulating (undoped) properties needed in a typical MEMS structure. Chemical vapor deposited (CVD) polycrystalline diamond (poly-C) films are inexpensive and retain many of unique properties of the single-crystal diamond. Two distinct forms of CVD poly-C are micro crystalline diamond (MCD) and ultra nano crystalline diamond (UNCD), grown in H rich and H poor environments, and having grain sizes in the ranges of 0.25 - 1 micrometers and 3 - 5 nm, respectively. However, the development of poly-C based single-material MEMS (SMM) technology faces a number of challenges including (a) growth of highly-insulating and -conducting MCD and UNCD films, (b) fabrication of MEMS structures containing MCD and UNCD layers, and (c) dry etching of MCD and UNCD multi-layer structures. In addition to a brief review of the conventional MCD and UNCD technologies, this talk, for the first time, addresses some of the SMM-related issues along with examples of fabricated SMM-based BioMEMS, RFMEMS, MEMS packaging, and field emission devices. Poly-C SMM structures are expected to lead to new applications in healthcare, environment and wireless communications.



### **Speaker's Biography:**

Dean M. Aslam received his Ph.D. (Dr. rer. nat.) in Electrical Engineering (1983) and M.S. (Dipl.Phys.) in Physics (1979) from Aachen Technical University (RWTH), Germany. Currently, Dr. Aslam is Associate Director of NSF ERC for WIMS (jointly awarded to U. of Michigan, Mich. State U. and Mich. Tech. U.), Director of Micro and Nano Technology Lab (MANTL) and Associate Professor of Electrical and Computer Engineering at Michigan State University. His current research is on micro- and nano-fabrication technologies focusing on polycrystalline diamond (poly-C), carbon nanotubes (CNT). He has published over 124 papers and holds 10 US patents in the field. He was a recipient of German DAAD Fellowship during 1975 - 83. Dr. Aslam is Associate VP Americas of MANCEF, a senior member of IEEE and founding Editor-in-Chief of Journal of Nanosystems and Technology (JNST).

**Public Invited**

Appetizers and Networking at 4:00 pm