



College of Engineering

Department of
Mechanical & Industrial Engineering

The Sidney E. Fuchs Seminar Series

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1200 Patrick F Taylor Hall



Bio-inspired manufacturing for advanced applications and social entrepreneurship

by **Ajay Malshe***

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Over millions of years, biological subjects have been in continuous combat with extreme environmental conditions. The fittest have survived through continuous evolution, an ongoing process. In particular, biological systems, which are the active interfaces between subjects and the environment, are being evolved to a higher state of intelligent functionality. These systems became more efficient by using combinations of available materials along with unique set of physical and chemical strategies. Noteworthy physical strategies include features such as texturing and structure, and chemical strategies such as sensing and actuation. These strategies collectively enable functional systems to deliver extraordinary adhesion, hydrophobicity, multispectral response, energy scavenging, thermal regulation, antibiofouling, and other advanced functions. Manufacturing industries have been intrigued with such biological strategies in the Nature in order to learn clever design architectures and implement those architectures to impart advanced functionalities into manufactured products. This talk delivers a critical review of such inspiring biological strategies and their nonbiological product analogs, where manufacturing science and engineering have adopted such advanced functional architectures. Seminar will also introduce opportunities for social innovations and entrepreneurship for students and faculty.

* Dr. Ajay Malshe is a Distinguished Professor of Mechanical Engineering and the 21st Century Endowed Chair Professor of Materials, Manufacturing and System Integration, Department of Mechanical Engineering, University of Arkansas, Fayetteville, AR. Among Dr. Malshe's awards and honors are Election to the National Academy of Engineering (NAE), Society of Manufacturing's (SME) David Dornfeld Blue Sky Manufacturing Idea award, SME-S.M. Wu Research Implementation Award; three Edison Awards for Inventor and Innovation; Tibbett Award, US Small Business Association sponsored by EPA for successful tech transfer; R&D 100 Award, Oscar of Innovations; Fellowships of the International Academy of Production Engineering (CIRP), the American Society of Materials (ASM), the American Society of Mechanical Engineering (ASME) and the Institute of Physics (IoP), London, England; multiple best paper awards including at the North American Manufacturing Research Conference (NAMRC 40), Society for Manufacturing Engineers (SME) (June 2012); NanoBusiness Alliances' Lifetime Achievement Award and Selected Most Influential Nanotechnology Leaders award; Special honor of getting listed and recognized under "Discoveries" on the National Science Foundation (NSF) home page* for a new process, "Electric Pen Lithography (EPL) for sub 20 nm scale machining and deposition using nano electric discharge machining (nanoEDM) (2005) and many more.