

**THURSDAY  
MARCH 1, 2007**

**Scaife Hall Auditorium  
Room 125**

**4:30 p.m.  
Refreshments—4:00 p.m.**

## **DR. JOEL SCHINDALL**

**PROFESSOR  
SCIENCE AND ASSOCIATE DIRECTOR  
LABORATORY FOR E/M AND ELECTRONIC SYS.. MIT**



Professor Schindall re-joined the MIT faculty in June of 2002 after a 35 year career in the defense, aerospace and telecommunications industries. He has taught courses in satellite communications, introductory circuit theory, and writing and communication skills (how to be effective in industry). His research includes the concept and development of a nanotube-enhanced ultracapacitor which holds the promise of being superior to electrochemical batteries as a means of efficient regenerative electrical energy storage, and a new method for dynamic simulation and reliability analysis of complex safety-critical systems (such as x-by-wire).

Professor Schindall received his B.S., M.S. and Ph.D. degrees in Electrical Engineering from MIT in 1963, 1964 and 1967. During his four graduate years, in addition to developing and teaching several courses, he was Chief Engineer at WBCN, a classical (in those days) FM radio station in downtown Boston.

**ECE Seminar Hosts:**

**Marija Ilic,  
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## Nano-Enabled Energy Conversion and Storage

Many significant efforts are being made today to identify and utilize new energy sources, to increase production of existing sources, to increase conversion and storage efficiency, and, equally important, to reduce pollution. However, incremental improvement will not be sufficient. What is needed are new approaches.

At the same time, we are entering an exciting era where we now have the technology to engineer materials on a nanometer scale, i.e. at dimensions comparable to the size of individual atoms and molecules. In my talk, I will explore nanotechnology as an "outside the box" technology that has the potential to "re-invent" (transform) some long-known but little-used technologies to the point that they may offer significant improvement over current ways of converting and storing energy.

One such transformation might be to use capacitors rather than batteries for highly efficient regenerative energy storage. Ridiculous? Perhaps not. In MIT's Laboratory for Electromagnetic and Electronic Systems, we are exploring a nanostructured ultracapacitor electrode that has the potential to increase a capacitor's energy storage density to approach that of a chemical battery.

Another transformation that will be described is the use of nanostructured emissive coatings and filters to significantly increase the efficiency of direct thermophotovoltaic (TPV) generation of electricity from heat.