



UNIVERSITY OF NOTRE DAME

AEROSPACE AND MECHANICAL ENGINEERING

365 Fitzpatrick Hall
Notre Dame, Indiana
46556-5637 USA

Telephone (574) 631-5430
Facsimile (574) 631-8341
E-mail amedept@nd.edu
Website <http://ame.nd.edu>

SEMINAR ANNOUNCEMENT

SPEAKER: Dr. Sebastian Osswald
Department of Materials Science & Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts

TOPIC: In situ Raman Spectroscopy Study of Oxidation of Nanostructured Carbons

DATE: Tuesday, December 8, 2009

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

ABSTRACT

The ability to synthesize a wide variety of carbon nanomaterials, functionalize their surface, or assemble them into three-dimensional networks has opened new avenues for material design. To fully exploit the great potential of carbon nanostructures, one needs to provide procedures that allow a selective separation of different carbon nanostructures and methods which enable a control of size and surface functionalization. Oxidation has become a frequently used method for purification of carbon materials, but it is also known for damaging or destroying the sample. In situ Raman spectroscopy during heating in a controlled environment allows a time-resolved investigation of the oxidation kinetics and can identify changes in material structure and composition. In this study, we applied in situ Raman spectroscopy to determine conditions for selective oxidation of different carbon nanostructures, including nanotubes and nanodiamond. Oxidation in air was also found to be a powerful route to control both average crystal size and surface chemistry in nanodiamond powders, thus allowing a better understanding of quantum confinement effects and contributions of surface functional groups to Raman spectra. The results of this study have successfully been used to develop simple and environmentally friendly procedures for purification and surface functionalization of carbon nanomaterials on an industrial scale.