UNIVERSITY of HOUSTON

CULLEN COLLEGE of ENGINEERING

Department of Civil & Environmental Engineering

Distinguished Lecture Series

Professor Deborah D.L. Chung
University at Buffalo,
New York State University

Multifunctional Continuous Carbon Fiber Polymer-Matrix Composite Materials for Thermoelectricity, Heat Dissipation and Strain/Damage Monitoring

Tuesday, November 13, 2012

1:00 – 2:00 p.m. Seminar
Room 102D, Engineering Bldg. 1, UH

Abstract

Polymer-matrix composites containing a high proportion of continuous aligned carbon fibers as the reinforcement are the dominant advanced lightweight structural materials for aircraft, satellites, sporting goods, etc. Although their structural performance is well established, the multifunctionality of these materials is a topic of active research. Multifunctionality means the ability to provide both structural and nonstructural functions. It allows the structure to be inherently smart, without the need to embed or attach devices. Compared to the use of embedded or attached devices, a multifunctional structural material is advantageous in the low cost, high durability, large functional volume and absence of mechanical property loss.

Nonstructural functions to be addressed in this seminar include the conversion of heat to electricity (i.e., thermoelectricity), heat dissipation and strain/damage monitoring. The energy conversion allows the structure to be self-powered. The heat dissipation is important due to the increasing thermal load of aircraft. The monitoring is needed for structural health monitoring, load monitoring and vibration sensing. The attainment of these functions requires the exploitation of thermoelectric, thermal conduction, electrical conduction and piezoresistive properties, which are aspects that have received relatively little attention in relation to structural materials. This seminar addresses the materials science of such multifunctionality.

About the speaker:

Deborah D.L. Chung is Professor of Mechanical and Aerospace Engineering and Director of Composite Materials Research Laboratory, University at Buffalo, State University of New York (SUNY) and Fellow of ASM International and American Carbon Society, with B.S. and M.S. degrees from California Institute of Technology (1973) and Ph.D. degree in Materials Science from Massachusetts Institute of Technology (1977), Honorary Doctorate from Alicante University, Spain (2011), Top Reviewer Award from Carbon Journal (2008), Niagara Mohawk Endowed Chair Professorship from University at Buffalo (1991), Chancellor's Award for Excellence in Scholarship and Creative Activities and Outstanding Inventor Award from SUNY (2003), and Pettinos Award from American Carbon Society (2004).

Professor Chung has been actively engaged in multidisciplinary research and teaching that are focused on materials science and engineering, including the development of materials for technological needs that relate to the electronic, communication, security, transportation, aircraft, environmental and civil infrastructure industries. Her peer-reviewed journal papers number about 500. Her h-factor at the Web of Knowledge is 44. Her authored books include "Composite Materials", 2d Ed., Springer (2010) and "Functional Materials", World Scientific (2010).