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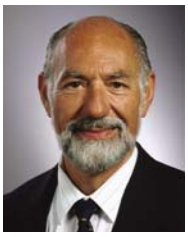

Dr. Sia Nemat-Nasser

Title: A New Horizon in Engineering Sciences: Biomimetic Multifunctional Materials

Speaker: Sia Nemat-Nasser, Distinguished Professor of Mechanics and Materials, Department of Mechanical and Aerospace Engineering, University of California, San Diego La Jolla, CA 92093-0416
Date: Friday, February 11, 2005, 1:30 P.M., Room 301 of Engineering Building

Abstract

Multifunctional structural materials possess attributes beyond the basic strength, stiffness that typically drive the science and engineering of the material for structural systems. The structural materials can be designed to have integrated electrical, magnetic, optical, locomotive, power generative, and other functionalities that work in synergy to provide advantages that reach beyond that of the sum of the individual capabilities. Materials of this kind have tremendous potential to impact future structural performance by reducing size, weight, cost, power consumption and complexity while improving efficiency, safety, and versatility. Nature offers numerous examples of materials that serve multiple functions. Biological materials routinely contain sensing, healing, actuation, and other functions built into the primary structures of an organism. In this lecture, I will examine the current state-of-the-art and the challenges that must be met in order to integrate multiple functions into fiber-reinforced polymers to create composites with basic structural attributes that can also possess tuned thermal, electromagnetic, self-healing, environmental sensing, self- prognosis, and energy harvesting functionalities.

***Sia Nemat-Nasser**,* Distinguished Professor in Mechanics and Materials, is a member of the National Academy of Engineering; Life Fellow of ASCE and ASME; Fellow of American Academy of Mechanics (AAM) and Society of Engineering Science (SES); and foreign fellow of the Danish Center of Applied Mathematics and Mechanics. He has been president, vice-president, and director of the SES, and has served as secretary and president of the AAM, and chair of the Materials Division of ASME. He has received the Technical University of Crete's Gold Medal (1997); the 2002 SES William Prager Medal in Solid Mechanics; the 2002 ASME Nadai Medal; the 2003 International Technology Institute's Willard F. Rockwell Medal, and elected honorary member of the World Innovation Foundation. Three times (1994-95, 1996-97 and 2000-01) has been selected by the graduating seniors as the best teacher of the year, and has graduated over 40 Ph.D.'s.

Sia has published nearly 420 research articles, a major book (coauthored with M. Hori, 1st ed., 710-page, 1993; 2nd revised ed., 810-page, 1999), and a 730-page treatise in Plasticity, published by Cambridge University Press 2004. A recent paper on electroactive ionic polymer-metal composites [*J. Appl. Phy.*, Vol. 92, 2002, pp. 2899-2915] was awarded by the American Society of Mechanical Engineers (ASME) the 2002 "Best Paper of the Year" in Adaptive Structures and Material Systems. Sia received his BS from Sacramento State (1960), his MS and Ph.D. from Berkeley (1961, 1964), while serving as an assistant professor at Sacramento State (1962-63). His academic career has been at Northwestern University (1964-66, and 1970-85) and at UC San Diego (1966-70, and 1985- present) where he established the Center of Excellence for Advanced Materials, serving as its director since 1987; spearheaded the creation of the Material Science and Engineering Program, serving as its founding director (1989-1994), and held the John Dove Isaacs Chair in Natural Philosophy (1996-2001).

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