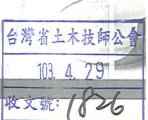






國家地震工程研究中心

National Center for Research on Earthquake Engineering



Thin Film Sensor Design Inspired by Biology

Location: R101 Date: May 14, 2014 Time: 10:00 AM- 11:30 AM

Kenneth J. Loh, Ph.D.

Associate Professor in the Department of Civil & Environmental Engineering Nano-Engineering and Smart Structures Technologies (NESST) Laboratory University of California, Davis (USA)



Abstract

Structural systems are susceptible to damage caused by deterioration, changir operating conditions, natural disasters, or unexpected events. Undetected damage can propagate and cause catastrophic failure. Thus, structural health monitorir (SHM) is crucial for identifying damage initiation, directing repair, and ensurir safety/reliability. While various SHM technologies have been proposed, this stude presents a new paradigm shift, where sensors are designed from a material perspective. By manipulating materials at the molecular level and then scalir them up to tangible length scales, one can engineer novel multifunction nanostructured materials. This seminar will highlight one example in which thin fil sensors that incorporate carbon nanotubes were inspired by the human skin.

itead of being discrete transducers, these "sensing skins" could be deposited onto and conform to various uctural surfaces like human skin. Specifically, the nanocomposite sensing skins were validated for spatiain, pH, corrosion, and impact damage sensing and were shown to be capable of accurately identifying mage (i.e., strain, impact, and corrosion) location and magnitude. These skins were also painted onto othe uctural surfaces or embedded in composite wind turbine blades for in situ damage detection. Some receivoratory test results and future directions will be discussed.

ort Biography

Kenneth Loh is currently a U.S. Fulbright Scholar in Taiwan and Visiting Associate Professor in the partment of Civil Engineering at the National Taiwan University (until October 2014). He joined the partment of Civil & Environmental Engineering at the University of California, Davis as an Assistant of Davis and Was recently promoted to Associate Professor with tenure. Prior to this, he received his degree in Civil Engineering from Johns Hopkins University in 2004. He continued his graduate studies and University of Michigan, where he completed two M.S. degrees in Civil Engineering (2005) and Material ience & Engineering (2008), as well as a Ph.D. in Civil Engineering in 2008. His research interests includualitifunctional materials, nano-engineering, biologically inspired systems, and resilient systems. Dr. Loh's cent honors include the Achenbach Medal, NSF CAREER Award, SPIE Senior Member honor, and several stipaper awards.

台灣省土木技師公會-曾煥郁

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重要性:

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2014/5/14國立台灣大學土木工程系客座副教授 Kenneth J. Loh, PhD 假國家地震工程研究中心 101 演講廳辦理專題演講·詳參附件海報資訊·

敬邀踴躍報名參加。

演講題目: Thin Film Sensor Design Inspired by Biology

演講日期: 2014年5月14日

時間: 10:00 AM - 11:30 AM

地點: 國家地震工程研究中心 101 演講廳 (台北市辛亥路三段 200 號)

講員: Kenneth J. Loh, PhD

服務單位: 國立台灣大學土木工程系客座副教授

Associate Professor, University of California, Davis

演講摘要:

Structural systems are susceptible to damage caused by deterioration, changing operating conditions, natural disasters, or unexpected events. Undetected damage can propagate and cause catastrophic failure. Thus, structural health monitoring (SHM) is crucial for identifying damage initiation, directing repair, and ensuring safety/reliability. While various SHM technologies have been proposed, this study presents a new paradigm shift, where sensors are designed from a materials perspective. By manipulating materials at the molecular level and then scaling them up to tangible length scales, one can engineer novel multifunctional

nanostructured materials. This seminar will highlight one example in which thin film sensors that incorporate carbon nanotubes were inspired by the human skin. Instead of being discrete transducers, these "sensing skins" could be deposited onto and conform to various structural surfaces like human skin. Specifically, the nanocomposite sensing skins were validated for spatial strain, pH, corrosion, and impact damage sensing and were shown to be capable of accurately identifying damage (i.e., strain, impact, and corrosion) location and magnitude. These skins were also painted onto other structural surfaces or embedded in composite wind turbine blades for in situ damage detection. Some recent laboratory test results and future directions will be discussed.

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