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# Thin Film Sensor Design Inspired by Biology

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

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**Abstract**

Structural systems are susceptible to damage caused by deterioration, changir operating conditions, natural disasters, or unexpected events. Undetected damag 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 stuc presents a new paradigm shift, where sensors are designed from a materia 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. ;tead of being discrete transducers, these "sensing skins" could be deposited onto and conform to variou uctural surfaces like human skin. Specifically, the nanocomposite sensing skins were validated for spati ain, pH, corrosion, and impact damage sensing and were shown to be capable of accurately identifyir 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 recei )oratory 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 th partment of Civil Engineering at the National Taiwan University (until October 2014). He joined th partment of Civil & Environmental Engineering at the University of California, Davis as an Assistar )fessor in 2009 and was recently promoted to Associate Professor with tenure. Prior to this, he received hi S. degree in Civil Engineering from Johns Hopkins University in 2004. He continued his graduate studies a 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 includ ltifunctional materials, nano-engineering, biologically inspired systems, and resilient systems. Dr. Loh' cent honors include the Achenbach Medal, NSF CAREER Award, SPIE Senior Member honor, and severa st paper awards.

台灣省土木技師公會-曾煥郁

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重要性: 高

各位會員您好；

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.

中華民國地震工程學會 轉發
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