SUBJECT:	Master's Thesis Presentation
BY:	Erik Sunden
TIME:	Friday, June 9, 2006, 10:00 a.m.
LOCATION:	Love Building, Room 109
TITLE:	Carbon Nanotube Synthesis for Microsystems Applications
COMMITTEE:	Dr. Samuel Graham, Chair (ME) Dr. William King, Co-Chair (ME) Dr. Satish Kumar (PTFE)

SUMMARY

Modern day engineering systems research presently lacks techniques to exploit the unique properties of many nanomaterials; coupled with this challenge exists the need to interface these nanomaterials with microscale and macroscale platforms. A nanomaterial of particular interest is the carbon nanotube (CNT), due to its enhanced physical properties. While a large part of the worldwide focus of CNT research has been in synthesis, an equally important area of research lies in CNT integration processes. The unique and useful properties of many nanostructured materials will never be realized in mainstream manufacturing processes and commercial applications without the proper exploration of integration methods such as those detailed in this thesis. The primary motivation for the research detailed in this thesis has been to develop CNT synthesis processing techniques that allow for novel interfacing methods between carbon nanotubes and eventual applications. In this study, an investigation was performed to look at several approaches to integrating CNTs into micro-electromechanical systems (MEMS). Synthesis of CNTs was studied in two different settings. Synthesis was first performed, apart from the microsystem, via a global scale chemical vapor deposition (CVD) process. Secondly, synthesis was performed directly onto a microsystem device via localized resistive heating. Following synthesis, the application of atomically layered, protective coatings was then investigated. Integration methods were then investigated to allow for CNT transfer to microsystem applications incapable of withstanding synthesis temperatures. The developed integration methods were evaluated by creating functional microscale electrical circuits in flexible substrates via hot emboss imprint lithography. Lastly, post synthesis processing methods were used to create micropatterned cell guidance substrates as well as neuronal stimulating substrates.