Purdue University

Materials Engineering

Seminar

Date: Thursday, Sept. 27, 2012

Time: 3:30 Refreshments and Seminar

Place: ARMS 1021

PURDUE MATERIALS ENGINEERING

Infinite Possibilities

Carbon Nanotubes as Electronic Materials Progress and Prospects

By:

Dr. Nathan Yoder

Chief Technology Officer

NanoIntegris, Inc.

ABSTRACT

Carbon nanotubes (CNTs) possess extraordinary electronic properties and have tremendous potential to enable new types of devices and add functionality to existing devices. Achieving this potential, however, requires the availability of exceptionally pure and electronically monodisperse carbon nanotubes. NanoIntegris was founded in 2007 to commercialize a method developed in the Hersam Research Group to separate CNTs by their physical and electronic structure. In the past 5 years, dramatic progress has been demonstrated as NanoIntegris has scaled up the production capacity and lowered the costs of separated CNTs. Today, NanoIntegris supplies high-performance CNT inks to over 700 organizations, including many Fortune 500 companies. The broad availability of these materials has accelerated progress in this field, with over 100 publications to date. Application areas include thin film transistors, analog RF devices, CMOS logic, radiation-hardened electronics, flexible/wearable electronics, RFID, chemical sensors, photodetectors and photovoltaics. Recent progress in device performance will be discussed, along with advances in CNT growth, purification and separation. Dr. Yoder will also discuss his personal experiences of working at an early stage startup company.

SHORT BIO

Dr. Yoder leads the R&D, manufacturing and intellectual property strategy for NanoIntegris, where he built the world's first commercial separated carbon nanotube production facility. Over the last five years, he has been responsible for a 10,000X increase in production capacity, as well as continued material optimization and new product development. These advances have resulted in sales to 700 customers in 40 countries, >$1.5M in government research contracts, and over100 new articles in peer-reviewed journals during the past 3 years. Dr. Yoder graduated from Purdue University with a B.S. in Materials Engineering (2002) and received his Ph.D. from Northwestern University in Materials Science and Engineering (2007), studying under Professor Mark Hersam. He has published on a variety of topics related to carbon nanotubes, nanotechnology, molecular electronics, and surface science. His work has been featured in Physical Review Letters, Journal of the American Chemical Society, Proceedings of the National Academy of Sciences, and Applied Physics Letters. He also holds Visiting Scholar positions at Northwestern University and Rice University.