THE OHIO STATE UNIVERSITY

The William G. Lowrie Department of Chemical and Biomolecular Engineering Graduate Program

Cordially invites you to attend a seminar on

Scalable Growth of Carbon Nanotubes using an Industrial Waste

Placidus Amama, Ph.D.

Associate Professor & Tim Taylor Chair in Chemical Engineering
Tim Taylor Department of Chemical Engineering
Kansas State University

Thursday, October 22nd, 11:30 AM
Zoom Webinar URL:
https://osu.zoom.us/j/96786297881?pwd=K0hGQUhVQjMrK2NsVjI1OFYvbTFOQT09
Password: 198887

Bio

Placidus Amama received his Bachelor's degree in chemistry from the University of Calabar (Nigeria) in 1992, and his master's and doctorate degrees in environmental engineering at Yokohama National University (Japan) under the MONBUSHO scholarship program in 1997 and 2002, respectively. After completion of his doctorate, he conducted two postdoctoral fellowships at the department of chemical engineering at Yale University (2002 – 2004) and Birck Nanotechnology Center, Purdue University (2004 – 2006) as a NASA-INaC fellow. He then worked as a research engineer at the Materials and Manufacturing Directorate, Air Force Research Laboratory (Wright-Patterson AFB) from 2007 until he joined the faculty at Kansas State University in August 2013. Amama's work has been recognized by several awards including JSPS Fellowship Award in 2012, 2016 NSF-EPSCoR First Awards, 2016 Outstanding Assistant Professor Award in the College of Engineering, NSF CAREER Award in 2017, and the Tim Taylor Chair in Chemical Engineering.

Abstract

There has been growing interest in scalable growth of carbon nanotubes (CNTs) because of their suitability in a growing number of important large-scale applications such as composites, energy storage, and catalysis. Although significant progress has been made in the past two decades in scaling up CNT production via catalytic chemical vapor deposition (CCVD), the process still faces key challenges such as short catalyst lifetime, low catalyst nucleation density, slow production rate, variations in CNT properties, and high cost of CNTs. To address these challenges, research activities so far have focused primarily on rational catalyst design and control of the nucleation and growth processes at the catalyst site, while less attention has been paid to innovating the feedstock. In my talk, I will discuss the use of the waste stream of Fischer-Tropsch synthesis (FTS) process (FTS-GP) as a feedstock for scalable and controlled growth of CNTs. Unlike conventional feedstocks (C_2H_2, C_2H_4, C_2H_5OH, etc.) that require strict process control, growth properties of CNTs (rate, area density, and quality) are generally less sensitive to FTS-GP fraction in the feed, and thus allow for easy optimization and scale-up. FTS-GP CCVD provides a new pathway for scalable, low-cost, and continuous production of CNTs that will meet their ever-increasing global demand while simultaneously reducing emissions of flue gases. In addition, I will discuss the closed-loop material system in FTS that supports synthesis of superior FT catalysts that will make FTS technology a viable choice for production of clean fuels.