

# *Synthetic Biomaterials as Functional Drug Delivery Systems*

Prof. Santimukul Santra

Chemistry, Pittsburg State University



Chemistry  
Seminar on  
Drug delivery

4:00 p.m.  
Monday  
May 3  
Via Zoom

Please contact  
Dr. Amitava  
Choudhury at  
[choudhurya@mst.edu](mailto:choudhurya@mst.edu)  
for the zoom link.

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**Abstract:** The design and syntheses of biocompatible materials are emerging fields of research. In particular, designer dendritic biopolymers are important for the targeted drug delivery and cancer therapy. When compared with linear counter-part, three-dimensional biodegradable nanostructures offer better solubility, aqueous stability and huge functionality to effectively target tumor, minimizing severe side-effects to the healthy cells. Our lab is focused on developing new biocompatible polymeric and polymer-based nanomedicines for the targeted delivery of theranostic agents to the specific tumor. In addition, new methods developed for the synthesis of novel activatable prodrugs for the effective treatment of cancer. The multi-step syntheses of biodegradable dendritic polymers are able to encapsulate therapeutic drugs, MR probes and prodrugs within their three-dimensional cavities during the formulation of nanomedicines. To evaluate the therapeutic efficacy of these customized nanomedicines, various *in vitro* and *in vivo* assays were performed. This presentation will highlight the important roles of organic synthesis, chemical biology and nanotechnology in the field of biochemical and biomedical applications, and our current efforts in partnering with industries to bring this technology to the clinic.

**About the speaker:** Santimukul obtained his MS and PhD degree from Banaras Hindu University and Indian Institute of Technology, Mumbai, India. He then came to USA as a post-doctoral fellow in University of Central Florida and worked there for about five years before taking up a position of Assistant professor in Pittsburg State University, Kansas. He is currently an associate professor. Besides teaching he is actively involved in research and acquired more than \$1 million funding from USDA, NIH, ACS-PRF, and private companies. He has published more than 45 peer-reviewed journal articles. His research interest lies in the interface of chemistry, biology and nanomaterials with emphasis on 1) multi-step dendritic biomaterials synthesis for designing new drug delivery systems, 2) synthesis of activatable prodrugs, MR probes and biologically active small molecules, 3) nanomedicine formulation for targeted cancer therapy, and 4) fabrication of nanosensors for biomedical applications.