ChE Seminar Series

Robert L. Pigford Memorial Lecture

- Friday, September 10, 2010
- 10:00-11:00am (refreshments available at 9:45am)
- 102 Colburn Laboratory

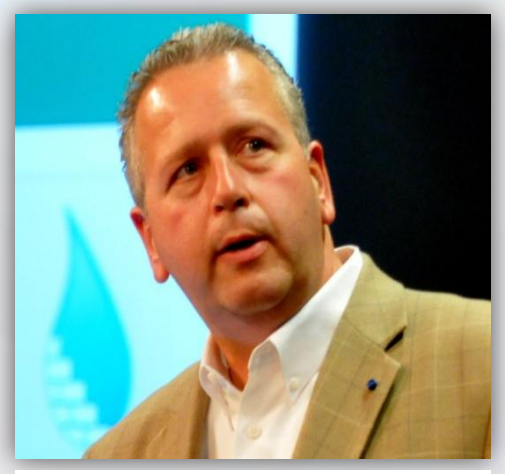


Photo by:J.W. Crawford/RTI International

Dr. Joseph DeSimone

Chancellor's Eminent Professor of Chemistry-UNC
William R. Kenan, JR. Professor of Chemical Engineering- NCSU

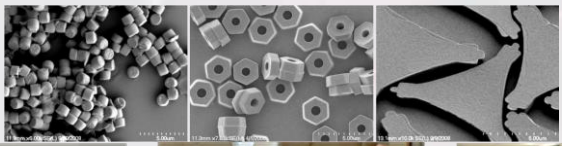
University of North Carolina, Chapel Hill
North Carolina State University

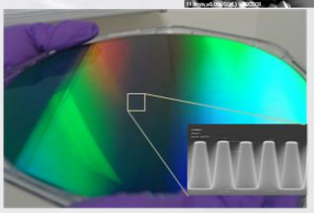
Professor Joseph DeSimone (UNC-Chapel Hill & NC State) specializes in adapting precision manufacturing approaches from the microelectronics industry for application in nano-medicine and in developing new strategies for the delivery of detection, imaging and therapeutic agents for the battle against human disease. DeSimone was the 2009 recipient of the NIH Director's Pioneer Award and the North Carolina Award, the State's highest civilian honor. He was the 2008 recipient of the Lemelson-MIT Prize and named one of the "100 Engineers of the Modern Era" by the American Institute of Chemical Engineers (AIChE) marking the 100th Anniversary of the AIChE. *Business Leader Magazine* awarded him the 2007/2008 Impact Entrepreneur of the Year for the Triangle. DeSimone is a fellow of the American Institute for Medical and Biological Engineering, the American Association for the Advancement of Science, the National Academy of Engineering and the American Academy of Arts and Sciences. For more information, please visit: http://desimone-group.chem.unc.edu/

"Top-down Nano-fabrication Technologies for the Production of Uniform, Shape-Specific Carriers for Vaccines, Biologics and Small Molecule Drugs"

To translate promising molecular discoveries into benefits for patients, we are taking a pharmaco-engineering systems approach to develop the next generation of delivery systems with programmable multi-functional capability. Our laboratory has pioneered the development of a technique called **PRINT** (**P**article **R**eplication **i**n **N**on-wetting **T**emplates). PRINT is a top-down particle synthesis method that extends the nano-fabrication techniques from the semiconductor industry to a high throughput, continuous roll-to-roll process. PRINT enables the fabrication of precisely defined micro- and nano-particles with control over particle size (20 nm to >20 micron), shape, chemical composition, cargo (proteins, adjuvants, therapeutics, oligonucleotides, siRNA, imaging agents), modulus (stiff, deformable - RBC mimics) and surface chemistries (antibodies, PEG chains, metal chelators), including the spatial distribution of proteins on the particle. In the history of delivery, particles have never had the uniformity, precision and chemical and shape control afforded by PRINT.

PRINT Platform molds discrete particles with unprecedented flexibility and control





Silicon Master

Roll-to-roll Mold

Pilot Manufacturing Line

PRINT Process. Left: 200 mm silicon wafer patterned with 400 billion 100-nm features; **Middle**: Six inch wide PRINT mold on continuous roll; **Right**: Custom designed PRINT machine located at Liquidia Technologies (*PRINT mold and machine images courtesy of Liquidia Technologies*).

Sponsored by the Department of Chemical Engineering – University of Delaware