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# Department of Chemistry

## Etter Memorial Lecture

9:45 a.m. Thursday, October 31, 2013 • 331 Smith Hall



### Professor Frances Ligler

Department of Biomedical Engineering, North Carolina State University  
& School of Medicine at the University of North Carolina—Chapel Hill

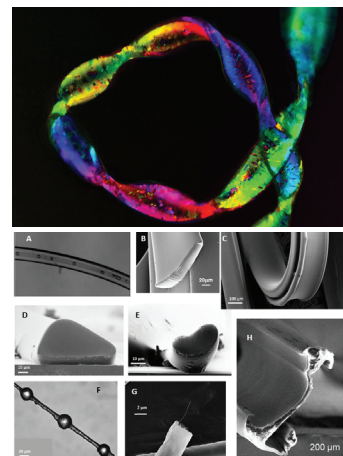
Frances S. Ligler is the Lampe Distinguished Professor of Biomedical Engineering, and a member and past chair of the Bioengineering Section of the National Academy of Engineering. She earned a bachelor's degree from Furman University and two doctorates from Oxford University. Currently working in the fields of biosensors and microfluidics, she has more than 350 full-length publications and patents, which have led to 11 commercial biosensor products and which have been cited more than 8,200 times. She is the winner of the Navy Superior Civilian Service Medal, the National Drug Control Policy Technology Transfer Award, the Chemical Society Hillebrand Award, the Navy Merit Award, the Naval Research Laboratory (NRL) Technology Transfer Award, three NRL Edison Awards for Patent of the Year, the Furman University Bell Tower and Distinguished Alumni of the 20th Century Awards, and the national Women in Science and Engineering (WISE) Outstanding Achievement in Science Award. She serves as an associate editor of *Analytical Chemistry* and on numerous editorial and advisory boards. Elected an SPIE Fellow in 2000 and a Fellow of AIMBE in 2011, she was awarded the Homeland Security Award (Biological, Radiological, Nuclear Field) by the Christopher Columbus Foundation and the Presidential Rank of Distinguished Senior Professional by President Bush. In 2012, she was awarded the Presidential Rank of Meritorious Senior Professional by President Obama.

Website: <http://www.bme.unc.edu/index.php/directory/userprofile/fsligler/>

### *Hydrodynamic Focusing for Sensing and Micro/Nano-Fabrication*

#### Abstract

Flow in microfluidic channels is laminar, i.e. streams flow in parallel without mixing. This absence of convection has both facilitated and frustrated the development of lab-on-a-chip systems. A plethora of publications describe mixers designed to overcome laminar flow limitations at low Reynolds numbers. The development of simple mixing structures in the microchannel walls started my lab on path to design microfluidic structures for a variety of applications including sensors and microflow cytometers. We learned to use hydrodynamic focusing of one laminar stream by another for separations, optical components, biosensors, cell analysis, and micromanufacturing. The journey I will describe includes target focusing to the sensor surface, creating fluid "walls" to confine electrical fields, fabricating flow cytometers for detecting pathogens in nasal wash or identifying marine algae, and manufacturing polymers with defined cross-sectional shapes. Hollow fibers have been fabricated to include metal nanoparticles and living cells.



#### Margaret C. Etter Memorial Lecture in Materials Chemistry

Margaret "Peggy" Cairns Etter was born on September 12, 1943. She died on June 10, 1992, from cancer. In 1974, she received her doctorate in chemistry from the University of Minnesota under the direction of Jack Gougoutas. She taught organic chemistry at Augsburg College in 1975-76, and worked at the 3M Company from 1976 to 1983. She returned to the University of Minnesota as a postdoctoral fellow with Robert Bryant in 1984 and, within a year, had secured an independent academic appointment. Peggy rose rapidly through the ranks and in 1990 was promoted to full professor. Peggy's outstanding characteristics as a scientist were her infectious enthusiasm, uncompromising scientific standards, and creativity. Her research group made major contributions in the applications of solid-state nuclear magnetic resonance spectroscopy, the design and properties of organic non-linear optical materials, and most significantly, in the understanding and utilization of hydrogen-bonding interactions in crystals. This was reflected in nearly 80 research papers and in several landmark review articles in prestigious journals. Outside recognition in the form of fellowships from the Sloan and Bush Foundations and an Iota Sigma Pi Award for Excellence in Chemistry represent incomplete reflections of the impact of this work. One of her extramural "side projects" was to found a company called "Rochelle Crystal Corporation," for which Peggy was named St. Paul Businessperson of the Year in 1986.

Host: Professor Andrew Taton Refreshments will be served prior to the seminar.