THE KELLY LECTURE

Arthur Kelly, an alumnus of the university, established the Kelly Fund at Purdue University in 1956. The income from this fund is used to bring outstanding scientists and engineers to the campus for lectures and discussions in the Department of Chemistry and the School of Chemical Engineering.

Carol K. Hall
Camille Dreyfus Distinguished University Professor
North Carolina State University

**Thermodynamic and Kinetic Origins of Alzheimer's and Related Diseases: A Chemical Engineer's Perspective**
3:30-4:30 p.m. Tuesday, April 21 • Room G140, Forney Hall

**Self-Assembly of Dipolar Particles: Designing Smart Materials Using Computer Simulation**
11:30 a.m.-12:30 p.m. Wednesday, April 22 • Room 3059, Forney Hall
Carol K. Hall
Camille Dreyfus Distinguished University Professor
Department of Chemical and Biomolecular Engineering
North Carolina State University
hall@ncsu.edu
http://turbo.che.ncsu.edu

Carol K. Hall is the Camille Dreyfus Distinguished University Professor of chemical and biomolecular engineering at North Carolina State University. She received her bachelor’s degree in physics from Cornell University in 1967 and her PhD in physics from State University of New York at Stony Brook. Prof. Hall completed a postdoctoral appointment in the chemistry department of Cornell University and worked briefly as an economic modeler at Bell Laboratories. In 1977, she accepted a position on the faculty of the chemical engineering department at Princeton University.

As one of the first women appointed to a chemical engineering faculty in the United States, Prof. Hall’s achievements in the field have helped expand the roles of women in science. In 1985, she joined the faculty of the chemical engineering department at North Carolina State University.

Prof. Hall’s research focuses on applying statistical thermodynamics and molecular-level computer simulation to topics of chemical, biological or engineering interest involving macromolecules or complex fluids. Her current research activities include self-assembly of dipolar colloidal particles, nanoparticles for the delivery of cancer drugs, heteropolymers with adjustable monomer sequences, hybridization of DNA, and the formation of fibrils and other molecular aggregates of peptides and proteins.

The author of over 190 publications, Prof. Hall is a fellow of the American Physical Society and was elected to the National Academy of Engineering in 2005.
Thermodynamic and Kinetic Origins of Alzheimer's and Related Diseases: A Chemical Engineer's Perspective
3:30-4:30 p.m. Tuesday, April 21 • Room G140, Forney Hall

The pathological hallmark of more than 20 neurodegenerative diseases including Alzheimer’s, Parkinson’s and the prion diseases, is the presence in the brain of plaques containing ordered protein aggregates called fibrils. It is not known why these structures form in some individuals and not others, or whether the plaques are toxic or nature’s way of sequestering toxic species. Prof. Hall will discuss current thinking on the scientific underpinnings of this phenomenon, and her computational efforts to help explain how and why proteins assemble into fibrils.

Self-Assembly of Dipolar Particles: Designing Smart Materials Using Computer Simulation
11:30 a.m.-12:30 p.m. Wednesday, April 22 • Room 3059, Forney Hall

Dipolar colloidal particles self-assemble into pre-defined microstructures that have the potential to serve as the foundation for a new generation of micro- and nano-structures of remarkable complexity. Prof. Hall will discuss the use of computer simulation to explore the self assembly, structure, crystallization and/or gelation of single-component and binary mixtures of colloid particles with permanent dipole moments.

Many different phase types are found, including ordered phases (FCC, HCP and BCT) at high-packing fractions and fluid, string-fluid and gel phases at low-packing fractions. The very low-volume fraction gel phases and the well-ordered crystal phases show promise for materials applications. The results of this study may help guide experimental colleagues in designing and engineering “smart” gels and materials.