Upon his retirement, a symposium in celebration of the career of

Professor Morton M. Denn

Albert Einstein Professor of Science and Engineering
Director Emeritus, Levich Institute
City College of New York
May 8, 2015

Symposium location:
Shepard Hall, Room SH95
The City College of New York
160 Convent Avenue
New York, NY 10031

Symposium Time:
9:00 AM-12:30 PM

9:10 – 9:55 AM
Professor Benny Freeman
University of Texas at Austin, Department of Chemical Engineering

From Reptation to Separations: Enduring Training in the Denn Laboratory

In the fall of 1983, I had the privilege of joining Professor Denn's polymer group at UC Berkeley. Professor Pino Marucci from the University of Naples was on sabbatical leave with the group at the time, and many group meetings and other lively discussions focused on scaling theory ("reptation"), particularly as it pertained to melt rheology. This topic was of keen interest to both groups and, in fact, to much of the polymer physics community at the time. Years later, the fundamental approaches I learned from these discussions were critically importance in formulating a model of the permeability/selectivity upper bound in gas separation membranes, a concept that has since been extended to many other membrane separations, including desalination, forward osmosis, and ultrafiltration. My early exposure to liquid crystalline polymers in Professor Denn's group became very important in understanding the basis for the high barrier properties in these materials. Professor Denn's focus on training students to communicate effectively and focus on scientific fundamentals have provided a durable, sturdy foundation from which to address research needs in a variety of areas, ranging from polymer design for hydrogen purification and carbon capture to new approaches to describe ion transport in polymer membranes.

9:55 – 10:40 AM
Professor Glenn Lipscomb
University of Toledo, Department of Chemical and Environmental Engineering

Rheology and Membranes

The success of the billion dollar membrane industry depends on fluid rheology and carefully orchestrated fluid contacting. Examples of this are provided, drawn from a variety of gas and liquid membrane separation technologies. How the mentoring provided by Professor Denn helped address these challenges is highlighted along with a behind-the-scenes glimpse into his research group on the Berkeley campus.

Morton Denn Symposium

10:40-11:00 AM Coffee Break

11:00 – 11:45 AM
Dr. Teh C. Ho
ExxonMobil Research and Engineering, Retired;
Hydrocarbon Conversion Technologies

Study of Hydrocarbon Fouling Propensity

This study aims to understand the relationship between the intrinsic fouling propensities of hydrocarbons and their physicochemical properties. By intrinsic it is meant that laboratory high-temperature experiments are conducted without foulant removal by hydrodynamic forces. The fouling behaviors of five crude oils are examined with a flow unit whose effluent temperatures decline due to the buildup of carbonaceous deposits. A theory is developed based on the premise that fouling is driven by a combined action of thermolysis and mass transfer. All the complexity of the fouling dynamics is wrapped up in a dimensionless group characterizing fouling severity. Of the 18 oil properties examined, the most influential ones are an oil's solvency index and the contents of asphaltenes, basic nitrogen, and metals. A combination of these four properties gives a fouling propensity index that correlates fouling data at three temperatures and identifies non- or low-fouling crude oils.

11:45 AM – 12:30 PM
Professor Alejandro Rey
McGill University, Department of Chemical Engineering

Structure and Dynamics of Biological Liquid Crystals

Biological liquid crystals are ubiquitous throughout Nature due to their anisotropy, self-organization, multifunctionality, structural properties, processability and responsiveness to a variety of external stimuli. Biological mesophases are classified into analogues (helicoidal plywoods), biopolymer solutions (in vitro DNA, polypeptides, collagen solutions) and in-vivo LCs (membranes, silk, DNA) and display the classical phases and textures found in synthetic materials. In this talk we present theory and simulation studies of the structure and dynamics of these three classes of biological liquid crystals that drive much of the current interest for biomimetic material applications and demonstrate that liquid crystal thermodynamic, rheological and material science principles also apply to Nature-based meosphases. The roots and links of this research with my thesis work under Professor Denn´s supervision are highlighted.