



DIVISION OF POLYMERIC MATERIALS: SCIENCE & ENGINEERING

## Cooperative Research Award in Polymer Science and Engineering

Sponsored by the Eastman Kodak Company

### 2005 Award Winners

Frank W. Harris

Stephen Z. D. Cheng

University of Akron

Bruce K. Winker

Rockwell International



The 2005 winners of the Cooperative Research Award in Polymer Science and Engineering presented by the American Chemical Society's (ACS) Division of Polymeric Materials: Science and Engineering (PMSE) are Professor Frank W. Harris, Distinguished Professor of Polymer Science and Biomedical Engineering and Director, Maurice Morton Institute of Polymer Science at the University of Akron, Professor Stephen Z. D. Cheng, Robert C. Musson Trustees Professor of Polymer Science, and Chair, Department of Polymer Science at the University of Akron, and Dr. Bruce K. Winker, Project Leader for the Organic Compensator Materials program at Rockwell International, Thousand Oaks, CA. Prof. David Schiraldi, Chair of the PMSE Cooperative Research Award Committee, announced the award, which is endowed by the Eastman Kodak Company, and has been presented annually since 1992.

The group of Professors Harris and Cheng, and Dr. Winker won the 2005 award for their highly productive and sustained collaboration in a range of areas, but especially for the development and large scale commercialization of negative birefringent polyimide compensator materials used in liquid crystalline displays. These compensators are key components in displays used in avionics and large screen televisions. The collaborative effort between the award winners was catalyzed by a National Science Foundation Science & Technology Center on Advanced Liquid Crystal Optical Materials (ALCOM) in which Professors Harris and Cheng were principal investigators, and Dr. Winker was an industrial partner. The collaboration, which began shortly after ALCOM's creation in 1991, generated numerous patents and publications throughout the decade which followed, and resulted in both the basic science associated with polyimide optical materials as well as development and commercial exploitation of the resultant inventions.

Negative birefringence occurs in a material when its in-plane refractive index is greater than its out-of-plane refractive index. The polymers developed by this team required synthesis of new monomers and polymers, and processing using common commercial solvents. Professors Harris and Cheng determined that the polyimide molecular structures could be used to control the extent of in-plane polymer chain orientation, which in turn controlled the degree of negative birefringence of the films. Dr. Winker developed a film coating process which produced the high quality thin films necessary for commercial applications, as well as developing a flexible laminate which facilitates the manufacture of the desired structures. The compensator films which resulted from this collaboration solve the major problem of loss of contrast in off-angle viewing of liquid crystal displays, and are therefore an enabling technology for this important industry.

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The award, which includes a \$3,000 prize, will be presented at PMSE's awards luncheon and will be recognized by the Symposium "Polymers for Optical Films and Advanced Materials: Cooperative Research Award honoring Frank W. Harris, Stephen Z. D. Cheng, and Bruce K. Winker" at the 229th American Chemical Society meeting in San Diego, California (March 2005).