Probing nano-scale structures of SmC* variant phases by resonant x-ray diffraction and optical probes

C. C. HUANG, University of Minnesota

Since the identification of antiferroelectric response in one liquid crystal compound having large polarization by Chandani et al., considerable experimental and theoretical effort has been aimed to gain a much better understanding of the molecular orientation order within each phases and associated molecular interactions. Employing polarization-analyzed resonant x-ray diffraction and specially-designed state-of-the-art ellipsometry systems, we have identified the molecular arrangements in three new SmC* variant phases, namely, SmC(alpha1)*, SmC(FI2)*, and SmC(FI1)*. Moreover, guided by our proposed phenomenological model to explain the stability of these phases, we have developed a novel experimental method to identify a new mesophase, namely, SmC(alpha2)* by employing an optical probe (wavelength = 633nm) to obtain an incommensurate nano-scale helical pitch structure with pitch length < 11nm. Collaborators of this project: P. Mach, P. Johnson, D. Olson, A. Cady, X. F. Han, L. S. Hirst, A. M. Levelut, P. Barois, H. T. Nguyen, J. W. Goodby, M. Hird, H. F. Gleeson, L. Furenlid, W. Caliebe, and R. Pindak.

1Supported in part by NSF