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Probing nano-scale structures of SmC* variant phases by resonant x-ray diffraction and optical probes[1]

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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.

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