

## The High-temperature Low-order SmAP<sub>F</sub>' to Low-temperature High-order SmAP<sub>F</sub> Transition

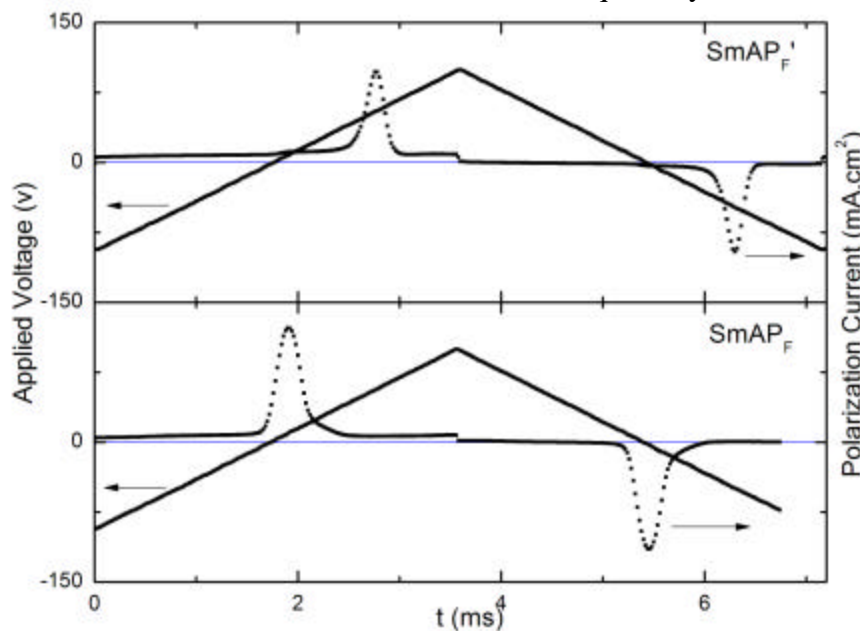
Chenhui Zhu<sup>a</sup>, Renfan Shao<sup>a</sup>, R. Amaranatha Reddy<sup>b</sup>, David M. Walba<sup>b</sup>, Noel A. Clark<sup>a\*</sup>

<sup>a</sup>Dept. Physics, 390 UCB, <sup>b</sup>Dept. Chemistry and Biochemistry, 215 UCB, and the Liquid Crystal Material Research Center, University of Colorado, Boulder, CO, 80303, USA

The SmAP<sub>F</sub> phase of bent-core materials has long been predicted, and a field-induced SmAP<sub>F</sub> has been reported [1]. We have recently observed a stable SmAP<sub>F</sub> phase, obtained by design for a dissymmetric bent-core mesogen with only one tail [2]. Here we report studies on a similar dissymmetric mesogen, which suggest the new material possesses the I-SmAP<sub>F</sub>'-SmAP<sub>F</sub>-Cry phase sequence on cooling, where the SmAP<sub>F</sub>' phase is essentially SmAP<sub>F</sub> but of lower order parameter of bent-core bow direction. Methods used to study the new material include DSC, X-Ray, and Polarized Light Microscopy in LC Cells and in Freely Suspended Films. The polarization switching behavior of the SmAP<sub>F</sub>' and the SmAP<sub>F</sub> phases are shown below. The SmAP<sub>F</sub> shows the V-shape switching, however the SmAP<sub>F</sub>' shows the bistable switching. The switching voltage threshold for the SmAP<sub>F</sub>' phase increases as the temperature increases, indicating a competition between thermal fluctuations and the electric field. The freely suspended film results show that the SmAP<sub>F</sub>' phase is of low birefringence but exhibiting some splay textures on a very small scale. (Work supported by NSF MRSEC Grant DMR0213918.)

References:

- [1] Y. Shimbo, E. Gorecka, D. Pocięcha, F. Araoka, M. Goto, Y. Takanishi, K. Ishikawa, J. Mieczkowski, K. Gomola, H. Takezoe. *Phys. Rev. Lett.* **2006**, 97, 113901.  
 [2] Walba, D. M.; Reddy, R.A.; Korblova, E.; Shao, R.; Jones, C. D.; Zhu, C.; Clark, N. A. Abstracts of the 11th International Ferroelectric Liquid Crystal Conference, **2007**, p31.



Polarization switching behavior in the SmAP<sub>F</sub>' (top) and in the SmAP<sub>F</sub> (bottom).