Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Observation of polarization current accompanying smectic A electroclinic reorientation RENFAN SHAO, LIXING WANG, CHRISTOPHER D. JONES, DAVID A. COLEMAN, DUONG NGUYEN, MICHI NAKATA, JOSEPH E. MACLENNAN, LCMRC and Univ of Colorado, PER RUDQUIST, Chalmers Univ of Tech, DAVID M. WALBA, NOEL A. CLARK, LCMRC and Univ of Colorado — We have been studying the liquid crystalline material W530, and report observations of polarization current of the field-induced molecular reorientation in the SmA phase. W530 exhibits the following phase diagram on cooling: isotropic – SmA – uncharacterized Sm'X' – metastable SmC – crystal. The temperature range of the SmA and SmX phases is $\sim 50^\circ$C, and x-ray diffraction (XRD) shows very little layer spacing change throughout the width of these two phases, while the SmC fractional layer compression is $\sim 5\%$. The SmX is nearly identical in appearance to the SmA phase under depolarized light microscopy (DPLM). However, when measuring polarization current while cooling from SmA to SmX, two polarization peaks appear throughout the range of the SmX phase. By adapting the Langevin model for deVries SmA, we are able to explain the two polarization peaks. Through a combination of DPLM cone angle and birefringence measurements, dielectric spectroscopy measurements, aligned sample and powder XRD experiments, and freely suspended film observations, we are able to show that the previously uncharacterized phase is a deVries SmA. Work supported by NSF MRSEC Grant DMR-0213918.

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Date submitted: 30 Nov 2005 Electronic form version 1.4