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The Effect of Aerosil Network on Smectic A-Reentrant Nematic Liquid Crystal MEHMET RAMAZANOGLU, SIMON LAROCHELLE, U. Toronto, ROBERT J. BIRGENEAU, U. Toronto and U.C. Berkeley — We report on a high resolution x-ray scattering study of aerosil dispersion effects on nematic-smectic A and smectic A-reentrant nematic phase transitions in 6OCB (hexyloxy-cyanobiphenyl) and 8OCB (octyloxy-cyanobiphenyl) liquid crystal mixtures. Dispersed aerosil particles introduce quenched randomness to the liquid crystal phases, which destroys the long range smectic order [1]. The experiment was conducted on mixtures with different 6OCB:8OCB concentrations and aerosil densities. The parabolic smectic A phase boundary is found to be slightly distorted in the presence of the aerosil network, with shifted transition and median (T_M) temperatures. Above T_M , the order parameter, susceptibility and parallel correlation lengths for the thermal and random parts of the structure factor show behaviors similar to those observed in non-reentrant nematic-smectic A second order phase transitions [2]. At T_M , where the order parameter has its maximum value, the scattering peaks are only defined by the random part of the structure factor. The smectic order parameter decreases with a further decrease in temperature, while the susceptibility and thermal correlation length increasingly show nematic-like behavior. Finally, at the lowest temperature, the mixtures are found in the reentrant nematic phase. [1] P.S. Clegg et. al. PRE 67,021703 (2003) [2] S. Larochelle et. al. in preparation

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