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Disordering Effects in Smectic – Aerosil Gels* VISHAL PANDYA, DANIELE FINOTELLO, Kent State University — We studied quenched disorder effects on the 12CB liquid crystal upon dispersion of silica nano particles (type A-300): hydrophilic silica spheres of diameter 7nm and surface area S = 300 m^2g^{-1}, with hydroxyl groups covering the surface. The LC-aerosil dispersions form a gel if aerosil density exceeds the percolation threshold. For low densities of aerosil dispersions and in cooling the sample, the LC director in the void volume is parallel and follows the external NMR field; a well defined and stable LC configuration forms. When a complete silica network forms and the sample orientation in the field is changed, a few silica links are broken by the field, re-aligning only a few Sm layers; the aerosil locks in the LC configuration which follows a P_2 (CosΘ) dependence. In contrast, if the dispersion is cooled from isotropic phase outside the field, the spectra in the Sm phase is a powder pattern. The field anneals the aerosil-induced random disorder up to a certain density beyond which, disordering effects dominate; for aerosil densities greater than $\rho_S \approx 0.055$ g/cm^3 spectral patterns are consistent with an isotropic distribution of smectic domains. The quenching of the 12CB Sm-A phase at $\rho_S \approx 0.055$ g/cm^3, is one order of magnitude less than that in 8CB [1]. The aerosil induced disorder, quantified by the percent of LC molecules in a powder pattern, depends linearly on the density. [1] T. Jin and D. Finotello, *Phys. Rev.* E 69, 041704 (2004); *Phys. Rev Lett.* 86, 818 (2001). *Supported by NSF-INT 03-06851, OBR B-7844 and B-7845.

Vishal Pandya
Kent State University

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