Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

^{2}H NMR study of the Assembly of Gold Nanoparticles Dispersed in Nematic Liquid Crystal[1] LINDA REVEN, J MILETTE, R. BRUCE LENNOX, ALEJANDRO REY, McGill University, Montreal, Qc, Canada, EZEQUIEL SOULE, Institute of Materials Science and Technology (INTEMA), University of Mar del Plata, Argentina — Gold nanoparticles (AuNP) with mesogenic ligands, tailored to be highly miscible in the liquid phase of 4-n-pentyl-4'-cyanobiphenyl (5CB) liquid crystal (LC), form reversible, micron-scale cellular networks upon cooling to the nematic phase. The network topology and LC director field orientation are controlled by the cooling rate, film thickness, ligand shell composition and AuNP concentration. Isotopically labeled samples allow selective probing of the orientational order of the NP ligands and host LC by ^{2}H NMR. The ^{2}H NMR spectra of AuNPs dispersed in nematic 5CB display isotropic and doublet peaks assigned to disordered and field aligned ligands respectively. The intensity of the ligand doublet signal increases relative to the isotropic peak with decreasing temperature and NP concentration. Conversely an isotropic peak along with the expected doublet is observed for the host 5CB in the nematic phase. The intensity of the host 5CB isotropic peak, which persists far into the nematic phase and decreases with NP concentration, shows the coexistence of isotropic and nematic phases. The NP ligand and host LC orientational orders are related the formation of the cellular network and theoretical phase diagrams of NP-LC dispersions.

[1]Centre for Self-Assembled Chemical Structures (CSACS-CRMAA) Linda Reven
McGill University, Montreal, Qc, Canada

Date submitted: 21 Nov 2011 Electronic form version 1.4