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Deep supercooling and relaxation processes in confined liquid crystals. FOUAD ALIEV, EDWIN ARROYO, SARMISTHA BASU, MANUEL RIVERA, University of Puerto Rico — Broadband dielectric and photon correlation spectroscopies has been applied for investigations of the dynamic behavior of liquid crystals (LCs) confined in porous matrices with random pores. We observed deep supercooling of LC in random pores. The relaxation times of the process due to the molecular reorientaions in deeply supercooled state are slower than at the temperatures corresponding to nematic phase by a 5-6 orders of magnitude. This slowing down is accompanied by anomalous broadening of the dielectric spectra. The relaxation processes due to reorientation of molecules (of liquid crystals confined in narrow random pores) around their short axis is glass-like and the temperature dependence of relaxation times obeys Vogel-Fulcher law. Dynamics of director orientational fluctuations was also strongly affected by random confinement and these fluctuations were not frozen at temperatures much bellow bulk crystallization temperature. The small pore size (surface effects) and random pore structure (geometrical disorder) stimulate partial disorder (at least at long scales) and prevent crystallization. Therefore LC supercooled in small random pores has properties typical for glass forming liquids.

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