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Activated Kinetics of Nematic and Smectic Phase Transitions in an Aligned Matrix of Nano-colloidal Liquid Crystalline Gel DIPTI SHARMA, UML — This study investigates an interesting thermal behavior of an aligned aerosil nano-colloidal system in the aligned matrix of octyl-cyanobiphenyl liquid crystal. This system was prepared by solvent dispersion method (SDM) where different densities of aerosil nanoparticles were added into octyl-cyanobiphenyl liquid crystal. Then samples were cycled into magnetic field during SmA-I transition to get an aligned matrix of nanocolloids. Heating scans were performed at various heating rates from 20 to 1 K min^{-1} using DSC. Aligned samples follow Arrhenius behavior and showed a decrease in transitions temperature for SmA–N and N–I transitions when compared with the unaligned samples. The activation energy of the aligned system increases and its respective enthalpy decreases for the lowest density of aerosils 0.05 g cm^{-3}, then for the further increase of aerosil density, the activation energy decreases and its respective enthalpy increases. The second order transition SmA–N shows a higher activated kinetics than the weak first order N–I transition. This can be explained in terms of molecular interaction in between aerosil nanoparticles and aligned liquid crystal molecules, and developed strain in the matrix of the aligned system.

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