Thesis Abstract

Liquid crystal (LC) is the one of the states of matter, which lies between solid and liquid. The molecules in this phase do not have positional order but have orientational order only. Because of this, it has both solid like anisotropic electrical, magnetic, and optical properties, and liquid like fluidity and coalescence. Therefore, it is used in the many of the advanced applications. For example, in displays, LC temperature sensors, biomedical applications, electronics, optical imaging, and switchable windows, etc. If this material is in the form of a nanoscale structure then it shows an extra special property due to its size along with material's inherit property. Now the research has been progressing in this direction. Because fabrication of high-performance, fast processing, portable device is the present objective. Even though many fabrication methods of nanoscale structures were already existed, whereas simple, repeatable, and low cost method is the present interest. Here we showed the simple, repeatable, and low cost methods of nanoscale structures for fabrication of complex material like LC. Further, we showed few potential applications by using these LC nanoscale structures. In this thesis, we could succeed to miniaturize the polymer by using physicochemical effect on dewetting. Further, solvent induced phase transitions of LC thin films were studied along with development of the LC vapour sensor device. By a simple spin-dewetting and contact line instability, LC nanoscale droplets were fabricated along ordering of these structures. Moreover, we showed few applications experimentally by using these micro or nanoscale droplets. For example, as temperature sensor, solvent vapour sensor, light reflecting droplets, translational motion of droplets, and rotational motion of droplets, etc.