INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	Ph.D.

Thesis Title: Electric Field Induced Patterning of Thin Polymer Film

Name of Thesis Supervisor(s)	:	Dr. Partho Sarathi Gooh Pattader
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SHORT ABSTRACT

Considering the present era of miniaturization, the demand for soft patterning in micro/nanoscale is an important and relevant topic for research. In this direction, the thesis of Mr. Pritam Roy titled "Electric Field Induced Patterning of Thin Polymer Film" provides important advancement of the existing know-how and describes a novel approach capable of modulating features, reducing time scale of deformation, and most importantly template-less patterning and e-writing. We reported the development of template-less electrohydrodynamic-contact-line-lithography (ECLL) to generate micropatterns on PDMS-liquid crystal interface. The novelty of this work lies in the use of a thin film of liquid crystals. Previous work mainly focused on the interface between air and polymer or between two polymer films. The unique properties of liquid crystals (high dielectric constants and low interfacial tension) and rheological properties of the polymer film bring new insights in the so-called electrohydrodynamic patterning. New types off patterns (micropillars vs. microwells) were found, and the time scale of pattern formation was shortened by orders of magnitude. This is an extension of the previously developed electric-field induced lithography (EFL) with some novel aspects. In addition, we discovered that the rapid spreading of the 5CB layer on PDMS surface leads to the three-phase contact line movement that triggers the formation of ordered microwell arrays. This discovery is quite exciting and new. In this thesis the fabrication technique of multilength scale hierarchical patterning was also explored in the combination of various soft lithographic techniques such as breath figures, micro-contact printing, and modulated electric field-induced lithography. The observations and methodologies reported in the present thesis will be helpful in the future exploration of microfabrication using an electric field with a thin polymer film.