A Chemist Approach to Order in Molecular Semiconductors

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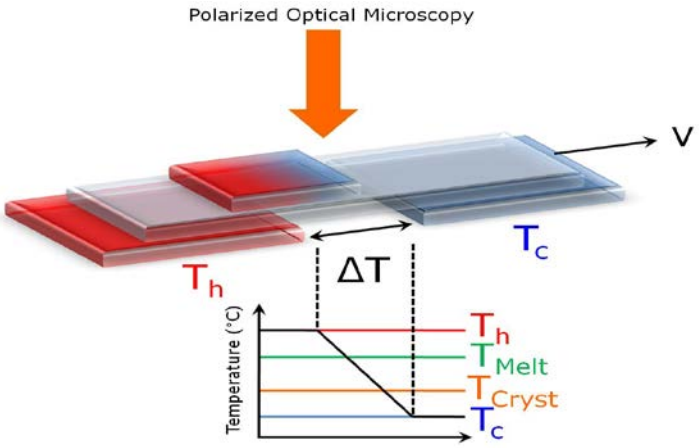
Abstract
Order is amongst the most important parameters that govern the physics of organic semiconductors (OSCs) [1] However, materials must be ordered at all length-scales, from molecular dimensions to macroscopic distances [2]. Liquid crystals constitute a unique class of materials that spontaneously self-assembles into single domain thin films with specific alignment [3-5]. Patterning of aligned single domains of liquid crystalline OSCs has recently been demonstrated [6,7]. Nevertheless, liquid crystalline semiconductors suffer from numerous structural defects created by their partial liquid character and that limit their charge carrier mobility [1,8,9]. Single crystals exhibits the highest charge carrier mobility of organic materials but their size, shape and alignment cannot be controlled yet. Recently, we have demonstrated that the size, shape and alignment of organic single crystals of OSCs can be modified with the use of a thermal gradient that allows the separation of nucleation and growth [10]. We will report several examples of directional crystallization and discuss the physical parameters that allow the fabrication of single crystals.



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