Electric-Field-Induced-Bulk Polymerization (EFIB-P) of 4-alkyloxyphenyl 4-((6-(methacryloyloxy)hexyl)oxy)benzoate monomers

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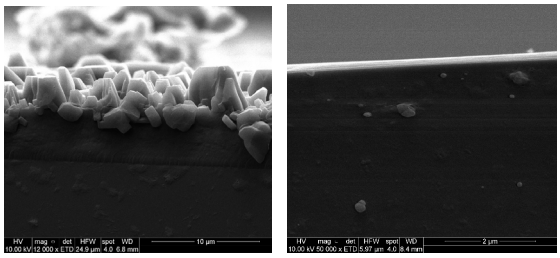
Over the past few decades, significant advances have been made in photopolymerization due to its immense potential as a rapid and straightforward production technique. However, conventional photopolymerization suffers from several limitations, such as limited ultraviolet (UV) light penetration in thick samples, oxygen inhibition, and the need for a photoinitiator [1]. As an alternative, Electric-Field-Induced Polymerization in Bulk (EFIP-B) [2] has emerged as an innovative, solvent-free approach that eliminates the need for chemical initiators, relying solely on applied voltage and thermal control [3]. This process enables the synthesis of polymers and exceptional macroscopic orientation when confined within alignment-layer-coated glass cells.

As part of an ongoing research program to expand the scope of EFIB-P candidates, we investigate a systematic series of (meth)acrylic monomers to compare their behavior with that of their acrylic counterparts. Our findings reveal that the formation of monolayered or bilayered mesophases is strongly dependent on the monomer alkyl chain length.



SEM images of EFIP cells: left as it is; right with solvent treatment.

These structural insights, complemented by scanning electron (SEM) and atomic force microscopy (AFM) will be presented, demonstrating how precise process implementation can tune material morphology for targeted optoelectronic device functionalities.

References

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[3] Romero-Hasler, P.; Soto-Bustamante, E.A., Journal of Molecular Liquids 2023, 382, 121901 https://doi.org/10.1016/j.molliq.2023.121901.