

Direct printing of organic single crystal nanowire arrays by using Liquid-bridge-mediated nanotransfer molding

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In recent years, organic thin film transistors OTFTs based on conductive-conjugated molecules have received significant attention. We report a fabrication of organic single crystal nanowires that made on Si substrates by liquid bridge-mediated nanotransfer molding (LB-nTM) with polyurethane acrylate (PUA) mold. LB-nTM is based on the direct transfer of various materials from a stamp to a substrate via a liquid bridge between them. In liquid bridge-transfer process, the liquid layer serves as an adhesion layer to provide good conformal contact and form covalent bonding between the organic single crystal nanowire and the Si substrate.

Pentacene is the most promising organic semiconductors. However pentacene has insolubility in organic solvents so pentacene OTFTs can be achieved with vacuum evaporation system. However 6, 13-bis (triisopropylsilylethynyl) (TIPS) pentacene has high solubility in organic solvent that reported by Anthony et al. Furthermore, the substituted rings in TIPS-pentacene interrupt the herringbone packing, which leads to cofacial π - π stacking.

The patterned TIPS-Pentacene single crystal nanowires have been investigated by Atomic force microscopy (AFM), Transmission Electron Microscopy (TEM), X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM) and electrical properties.

Keywords: Liquid-bridge-mediated nanotransfer molding, organic single crystal nanowire