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## Synthesis, characterization and photovoltaics studies of 3-alkylthienyl thiophene based polymers prepared via direct arylation polymerization

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### Abstract

The synthesis and characterization of two novel 3-thienyl based polythiophene derivatives PT and BT have been presented. These polymers have been synthesized by convenient and ecofriendly Pd catalyzed direct arylation polymerization method. In these polymers the alkyl side chain has been replaced by alkylthienyl side chain and polymer PT analogous to regioregular poly(3-hexylthiophene) (rr-P3HT) has been synthesized. These polymers have been characterized by  $^1\text{H}$  NMR, GPC, TGA and UV vis absorption spectroscopy. The absorption maxima of these polymers are comparable to the rr-P3HT. The polymers have very good solubility in common organic solvents and therefore the solution processing of these materials has been easily done. Solar cells of these polymers have been fabricated by using PT and BT as donor materials and PC61BM as acceptor material. It was observed that both the materials showed almost same photovoltaic characteristics. Solar cell performance of these materials has been found to be low and we are working on the optimization and improvement of power conversion efficiency of these materials.

### Keywords

Direct arylation polymerization P3HT thienyl thiophene Solar cell