

**An efficient and rapid microwave-assisted synthesis of poly(3-thiophenyleacetic acid) polymer and its uses as a sensitizer in photocells**

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A simple, efficient and rapid- microwave (MW) assisted method was developed for the synthesis of poly (3-thiophenylacetic acid) (P3TAA) in which the total synthesis consists of esterification of 3-thiophenyl acetic acid with acidified alcohol and hydrolysis of poly (3 -methyl acetate in aqueous alkaline media. Relative yields in esterification and hydrolysis were compared by MW and conventional (CV) refluxing methods at ambient atmospheric pressure. Relative yield of P3TAA was enhanced approximately by two fold, the whole reaction time was reduced by three fold when the MW assisted methods were employed. Photoelectrochemical cells were fabricated and tested comprising P3TAA as a sensitizer for TiO<sub>2</sub>. Dramatic enhancements in the cell performances were observed with the addition of ionic liquid 1-methyl 3-n hexylimidazolium iodide in to the electrolyte. The photocell TiO<sub>2</sub>/P3TAA/I<sup>3</sup>-/I<sup>-</sup> generated a short-circuit photocurrent of ~ 9.5 mA cm<sup>-2</sup>, an open-circuit photovoltage of ~ 400 mV with a total power conversion efficiency of ~ 2.4% under simulated full sunlight of 100 mW cm<sup>-2</sup> (Air Mass 1.5).