Proceedings of the Peradeniya University International Research Sessions, Sri Lanka, Vol. 20, 4th & 5th November 2016

Abstract No: 216 *Natural Sciences*

Synthesis and characterization of plant based thiophene and 3-hexylthiophene copolymers

U. Kodithuwakku, M.A.B. Prashantha and D.R. Ratnaweera*

Department of Chemistry, University of Sri Jayewardenepura, Sri Lanka
**dilru@sci.sjp.ac.lk*

Polythiophene and its derivatives have become more desirable due to their applications in various fields. These applications arise due to their inherent properties, such as optical and electronic conductive properties; as well as thermal and environmental stability. Precursors of polythiophenes are generally obtained from petroleum by-products, which are non-renewable. It has been reported that precursors of polythiophenes and its derivatives are naturally available in different types of *Tagetes* species such as *Tagetes erecta, Tagetes tenuifolia*, etc. A number of thiophene derivatives such as 2, 2':5', 2''-terthienyl (Alpha-T), 5-(3-buten-1-ynyl)-2, 20-bithienyl (BBT), 5-(4-hydroxy-1-butynyl)-2, 20-bithienyl (BBTOH), and 5-(4-acetoxy-1-butynyl)-2, 20-bithienyl (BBTOAc), were found and identified, specifically in the roots of *Tagetes* species. The current study reports the polymerization of the extracted thiophene derivatives from *Tagetes erecta* and 3-hexylthiophene (3HT) to obtain a random copolymer of poly (thiophenes-3-hexylthiophene). The extracted thiophene derivatives were partially purified and characterized. The mixture of plant based thiophenes and commercial 3HT with various weight compositions were selectively polymerized on the direct one-step chemical oxidative free radical polymerization to obtain co-polymers. Structural characterization of the synthetic products was done using Fourier Transformation Infrared, Proton Nuclear Magnetic Resonance, Ultra Violet Visible and X-ray Diffraction techniques. Homopolymers of polythiophene obtained from plant based thiophenes have limited processability of solar cells due to poor solubility in common organic solvents. 'However, a significant progress of the solubility was observed with copolymers having partial contribution of 3HT.

Financial assistance given by the research grant (ASP/06/RE/SCI/2013), University of Sri Jayewardenepura is acknowledged.