

# Synthesis, Characterization and Thermal Study of Composite of Polythiophene with Cyano Complex of Tungstate(IV)

Syed Kazim Moosvi<sup>1</sup>, Kowsar Majid<sup>2\*</sup> and Tabassum Ara<sup>3</sup>

National Institute of Technology Srinagar, Hazratbal Srinagar-190 006

E-mail: <sup>1</sup>kowsarmajid@rediffmail.com, <sup>2</sup>msyedkazim@gmail.com

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**Abstract**—Present work involves the synthesis of composite of Polythiophene with Potassium octacyanotungstate(IV) dihydrate ( $K_4[W(CN)_8].2H_2O$ ) via in-situ oxidative chemical polymerisation method using  $FeCl_3$  as oxidant. The as synthesised composite has been subjected to FTIR, X-ray diffraction, and, SEM characterization techniques which confirm the successful synthesis of the composite. FTIR spectrum of the composite shows the appearance of vibrational peaks of  $K_4[W(CN)_8].2H_2O$  though with some shift which indicates the successful formation of PTh/ $K_4[W(CN)_8].2H_2O$  Composite. XRD shows crystalline structure of  $K_4[W(CN)_8].2H_2O$ , which has been retained in the composite. Thermal study was carried out by recording TGA which shows higher thermal stability of composite in comparison to pure Polythiophene. This shows a significant interaction between Polythiophene and  $K_4[W(CN)_8].2H_2O$ . The higher thermal stability of the composite enables it to be used for high temperature applications.