POLYTHIOPHENE/BASALT COMPOSITES: SYNTHESIS, STRUCTURAL ANALYSIS AND DIELECTRIC PROPERTIES

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In this work, Polythiophene/Basalt composites with different basalt contents vary from 2% to 8% (wt./wt.) have been prepared by chemical method. The chemical composition of the basalt, which is a type of volcanic rock, has been determined by XRF technique. The surface morphology and chemical properties of the composites have also been analyzed by SEM and FTIR measurements. The dielectric spectra of pure PT and basalt doped PT composites have been investigated by impedance spectroscopy analysis performed within 10Hz-40MHz frequency region for 293-373K temperature interval. The frequency dependences of the real and imaginary components of complex dielectric function revealed that the system can be considered as layered structure which consists of well conducting grains surrounded by poorly conducting grain boundaries and defined by Koop's bilayer theory. Moreover, basalt doping increases ε' values which represents the charge storage ability of the dielectric material. Especially, the highest charge storage ability at room temperature has been determined for 4% basalt doped PT composite.

Keywords: Polythiophene, Basalt, polymer composite, dielectric properties