Proton Ion Conducting Solid Polymer Electrolytes Based on Chitosan Incorporated with Various Amounts of Barium Titanate (BaTiO_3)

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Here the impact of barium titanate (BaTiO_3) nano filler on both electrical and dielectric properties of proton conducting solid polymer electrolytes based on chitosan have been discussed using AC impedance spectroscopy. The impedance data reveals that up to 3 wt. % of BaTiO_3 , the conductivity shows an increase. At low frequency, the maximum values for both dielectric constant and dielectric loss have been observed. Further distinguishable peaks have been observed in the imaginary part of electric modulus while no such peaks were observed in dielectric loss spectra. From the Argand plots, the relaxation processes was interpreted. At low temperature, the DC conductivity versus reciprocal of temperature obeys the Arrhenius equation and at the high temperature, the curvature was obtained as an evidence for ion transport process with the aid of polymer segmental motion. Grotthuss mechanism was used to interpret the conductivity behaviors of the samples.

Keywords: Polymer Composite, barium titanate, Proton Ion Conductor, Relaxation process, Arrhenius and VTF equations

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