

**EFFECT OF TiO₂ NANOFILLER ON PVA/PVP BASED
ALKALINE SOLID POLYMER ELECTROLYTE**

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ABSTRACT

EFFECT OF TiO₂ NANOFILLER ON PVA/PVP BASED ALKALINE SOLID POLYMER ELECTROLYTE

Alkaline solid polymer electrolyte (ASPBE) containing a blend of poly(vinylalcohol) (PVA) and poly(vinylpyrrolidone) (PVP), potassium hydroxide (KOH) as an ionic dopant as well as titanium(IV)dioxide (TiO₂) as a nanofiller were prepared by solution casting technique. The concentration ratios of the polymer blend, ionic dopant and nanofiller were varied systematically. The conductivity was studied using impedance spectroscopy in order to investigate ionic conduction in composite PVA/PVP-KOH + TiO₂ electrolyte systems. The conductivity for composite samples with selected composition from 4 wt.%, 6 wt.%, 8 wt.% and 9 wt.% of TiO₂ were determined at various temperatures. The 8 wt.% composition of TiO₂ nanofiller sample gave the highest conductivity of 1.43×10^{-1} S/cm at room temperature. The conductivity-temperature dependence of the entire samples obeyed Arrhenius rule implying that a hopping mechanism of the in charge carrier is taken place. The activation energy, E_a of 0.3144 eV was obtained for the highest conducting sample. Electrical properties were than further characterized on the data collected from impedance studies. The conduction mechanism of the charge carrier followed quantum mechanical tunneling (QMT) model. This conduction mechanism apparently occurred according to ion hopping mechanisms.