Morphology, Thermal and Impedance Characteristics of Iodine Doped Metal Iodide-Epoxydized Natural Rubber (MI-ENR) Polymer Electrolytes

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A series of metal iodide-epoxydized natural rubber (MI-ENR) (where M= Li, Na, K or Ag) and their iodine (I₂) doped derivative (I₂/MI-ENR) polymer electrolytes (PEs) were successfully prepared via solvent casting method. The PEs were characterized using UV-vis, FTIR and SEM/X-mapping techniques. Their thermal properties were studied using DSC and TG analysis while the ionic conductivity characteristic was evaluated using the impedance spectroscopy. The glass transition temperature (T_g) and impedance characteristics of the MI-ENR PEs is dependent on the solubility of MI salt in the ENR, the interaction of MI with ENR and the outcome morphology of the PE. The alkali metal iodides, MI (M= Li, Na or K) do not affect the thermal stability of ENR in the respective PEs. However, the AgI destabilized the ENR in the AgI-ENR PE. Doping the MI-ENR PEs with I₂, caused increment in T_g, enhancement in thermal stability and changed the conduction mechanism.

Keywords: ENR, iodine, polymer electrolyte, metal iodide, thermal, impedance

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