

High Efficiency Electrolyte Lithium Battery and RF Characterization

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Abstract : The dielectric properties and ionic conductivity of novel "ceramic state" polymer electrolytes for high capacity lithium battery are characterized by radio-frequency and Microwave methods in two broad frequency ranges from 50 Hz to 20 KHz and 4 GHz to 40 GHz. This innovative solid polymer electrolyte which is highly ionic conductive (10-3 S/cm at room temperature) from -40 oC to +150 oC and can be used in any battery application. Such polymer exhibits properties more like a ceramic rather than polymer. The various applied measurement methods produced accurate dielectric results for comprehensive analysis of electrochemical properties and ion transportation mechanism of this newly invented polymer electrolyte. Two techniques and instruments employing air gap measurement by capacitance bridge and inwave guide measurement by vector network analyzer are applied to measure the complex dielectric spectra. The complex dielectric spectra are used to determine the complex alternating current electrical conductivity and thus the ionic conductivity.

Keywords : polymer electrolyte, dielectric permittivity, lithium battery, ionic relaxation, microwave measurement

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