Short Communication

A Novel Molybdotungstosilicate Gel Electrolyte with Wide Electrochemical Stability Window

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New hybrid gel electrolyte [MIMPS]₄SiW₁₁MoO₄₀ (IL-SiW₁₁Mo) has been synthesized from the heteropoly acid H₄SiW₁₁MoO₄₀ and 1-(3-sulfonic group) propyl-3-methyl imidazolium (abbreviated as MIMPS). The results of FTIR and XRD reveal that the synthesized polyoxometalate-based gel electrolyte possesses lamellar structure and exhibits the characteristic thermo-tropic liquid-crystalline behavior, which can undergo a phase transformation from a viscous gel state to liquid state below 100 °C. Its ionic conductivity of up to $\sim 10^{-3}$ S cm⁻¹ was observed above the phase transformation temperature. The electrochemical stability potential window (ESW) of IL-SiW₁₁Mo was found to be about 4V at room temperature. The electrochemical impedance spectroscopy (EIS) was carried out to study the capacitance and ion mobility of IL-POM used as electrolyte. The results show that IL-SiW₁₁Mo has high capacitance and fast ion mobility.

Keywords: polyoxometalates; structural; ionic conductivity; amorphous materials; electrochemical stability potential window.

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