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Highly Viscous Composite Gel Electrolyte based on Cellulose Acetate and Nanoparticles

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ABSTRACT

This paper describes the effect of the addition of fumed silica nanoparticles in a composite gel electrolyte based on cellulose acetate and LiClO₄. Changes in the viscosity, conductivity, morphology, diffusion and dynamic process of ion transport to a conductive polymer film on an ITO substrate were characterized to determine the nature of the nanoparticle interaction with the gel electrolyte. Fumed silica nanoparticles and cellulose acetate formed a linked network resulting in a highly viscous gel. The resulting composite gel electrolyte had a viscosity of 982.1 mPa.s and a conductivity of 4.39 ± 0.30 mS cm⁻¹ at 25°C, with potential applications including in electrochemical devices.

Keywords composite gel electrolyte, fumed silica, cellulose acetate, lithium perchlorate

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