Effect of dimethyl carbonate (DMC) on the electrochemical and cycling properties of solid polymer electrolytes (PVP-MSA) and its application for proton batteries - DTU Orbit (01/12/2018)

**Effect of dimethyl carbonate (DMC) on the electrochemical and cycling properties of solid polymer electrolytes (PVP-MSA) and its application for proton batteries**

Proton-conducting polymer electrolyte systems (PVP-MSA), with polyvinylpyrrolidone as a host polymer and methanesulfonic acid as a proton donor, were prepared by a facile solution-cast technique. The effects of plasticizer, dimethyl carbonate, on the electrical and electrochemical properties of PVP-MSA complexes were plausibly investigated for the first time. The complexation behaviors of both plasticized and unplasticized polymer electrolyte systems were confirmed with the aid of Fourier transform infrared spectroscopy. The conductivity values were found to be enhanced due to the addition of DMC, and a maximum value of $3.27 \times 10^{-5}$ S/cm was achieved. The ionic transport number values were found to be in the range of 0.96–0.99. The discharge analysis suggested that the proton battery constructed with the plasticized polymer electrolyte showed better performance compared to that constructed with the unplasticized polymer electrolyte, which in turn means it could be utilized as a promising candidate for primary proton batteries.

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