# Determination of charge carrier transport properties of gellan gum–lithium triflate solid polymer electrolyte from vibrational spectroscopy


## ABSTRACT

Mobility and number density of charge carriers are important parameters that influence the electrolyte conductivity. Therefore, knowing these parameters quantitatively is of great significance. In this work, solid polymer electrolytes have been prepared by solution casting technique using gellan gum complexes with lithium triflate (LiTf). The conductivity of the electrolyte increases from 3.35 108 S cm1 (electrolyte with 10 wt% LiTf) to 5.38 104 S cm1 (electrolyte with 40 wt% LiTf). The increase in conductivity was attributed to the increase in mobility and number density of charge carriers in the electrolyte from 6.63 109 cm2 V1 s 1 to 1.25 106 cm2 V1 s 1 and from 4.00 1020 cm3 to 2.68 1021 cm3, respectively. The electrolyte conductivity is seen to decrease as LiTf salts were added more than 40 wt% concentration due to the decrease of charge carrier mobility to 8.58 107 cm2 V1 s1. The variation of conductivity obtained in this work is dominantly influenced by the mobility of charge carriers in the electrolyte as proven from the Fourier transform infrared approach.



**Keyword:** Gellan gum; Polymer electrolyte; FTIR deconvolution; Transport properties of charge carriers