

## **Hybrid carboxymethyl kappa-carrageenan/carboxymethyl cellulose- based biopolymer electrolytes for dye-sensitized solar cell application**

### **ABSTRACT**

Natural biopolymers have recently attracted a lot of attention for the development of new polymer electrolytes due to their environmental friendliness, nontoxicity, and abundance in nature. Biopolymer electrolytes based on carboxymethyl kappa carrageenan/carboxymethyl cellulose incorporated with sodium iodide were prepared and their structural and electrochemical stability were investigated using electrochemical impedance spectroscopy, Fourier transform infrared spectroscopy, transference number measurement, and linear sweep voltammetry. The film containing 30 wt% sodium iodide had the highest ionic conductivity and the highest relative number of charge carriers at room temperature. The relative number of charge carriers for each prepared electrolyte film in this study increased with salt concentration, according to Barker's electrolyte dissociation theory. The highest conducting electrolyte and the lowest salt concentration electrolyte films were used to fabricate and characterise dye-sensitized solar cell (DSSC). These DSSCs responded well to a light intensity of 100 mW cm<sup>-2</sup>.

**Keyword:** Polymer blend; Electrolytes; Carboxymethyl kappa-carrageenan; Carboxymethyl cellulose; Sodium iodide