

Solid Polymer Electrolyte Prepared From Nostoc Commune Cyanobacteria Exopolysaccharides

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Abstract : A wide range of bacteria synthesizes and secretes polymeric substances composed of a mixture of high-molecular-mass heteropolysaccharides. *Nostoc commune* cyanobacteria grow in colonial spherules of 10-20 mm in diameter. These spherules are filled with an internal gel made from a variety of polysaccharides known as *Nostoc commune* exopolysaccharides (NCE). In this paper, we report the use of these exopolysaccharides as a raw material for the preparation of a solid polymer electrolyte. Ammonium iodide and 1-butyl-3-methylimidazolium chloride ([Bmim]Cl) salts were used to provide NCE films with ionic conductivity. In addition, a carboxymethylation treatment was used to further increase the conductivity of NCE films. The structural characterization of the NCE films was assessed by FTIR, XRD, and DSC tests. Broadband dielectric spectroscopy (BDS) and dielectric thermal analysis (DETA) were used to evaluate the ionic conductivity of the samples. The results showed that NCE can be used to prepare solid polymer electrolyte films and that carboxymethylation improves their ionic conductivity. These NCE films can be used in the development of novel energy storage devices such as flat batteries or supercapacitors.

Keywords : polymer electrolyte, *Nostoc commune*, cyanobacteria, exopolysaccharides

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