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Effect of 1,3-phenylenediamine concentration on the properties of poly(aniline-co-1,3-phenylenediamine) cryogels

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Abstract

Poly(aniline-co-1,3-phenylenediamine) cryogels were prepared by a simple one-step approach involving oxidative cryopolymerization of respective comonomers in the presence of poly(vinyl alcohol) stabilizer. Resulting cryogels were characterized by SEM, Raman spectroscopy, conductivity and tensile measurements. The addition of small amounts (1 mol%) of 1,3-phenylenediamine into copolymerization with aniline allows the significant increase of cryogel pore sizes without substantial change in conductivity and mechanical stability. This is the important parameter for future use of such composites cryogels in biomedicine and electrochemistry.

Keywords: cryogels, polyaniline, 1,3-phenylenediamine, copolymers

1. Introduction

Conducting polymer hydrogels are a developing class of materials combining unique physico-chemical properties of polyaniline with mechanical properties of water-soluble polymer matrix [1, 2, 3]. They have potential to be used in electrochemical and biomedical applications, namely as supercapacitors [4; 5], gel-electrolytes [6], drug-carriers [7; 8], tissue-scaffolds [9], etc.

One-step cryopolymerisation is one of the recent techniques for preparation of mechanically stable macroporous polyaniline-based hydrogels with uniform distributions of conducting components [10]. This approach involves oxidative polymerization of aniline in the presence of poly(vinyl alcohol) as a

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