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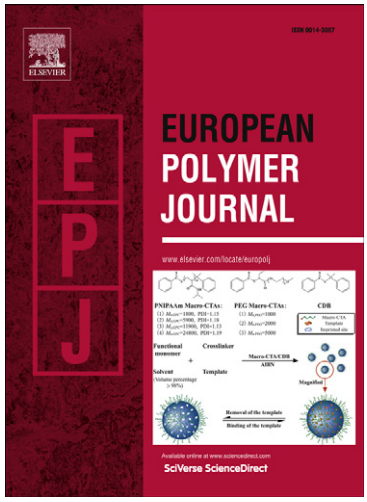

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David Pahovnik, Ema Žagar, Ksenija Kogej, Jiři Vohlídal, Majda Žigon

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Polyaniline nanostructures prepared in acidic aqueous solutions of ionic liquids acting as soft templates

David Pahovnik[a], Ema Žagar[a,b], Ksenija Kogej[c], Jiři Vohlídal[d], Majda Žigon[a,b,*]

[a]Laboratory for Polymer Chemistry and Technology, National Institute of Chemistry, Hajdrihova 19, 1000 Ljubljana, Slovenia
[b]Centre of Excellence for Polymer Materials and Technologies, Tehnološki park 24, 1000 Ljubljana, Slovenia
[c]Department of Chemistry and Biochemistry, Faculty of Chemistry and Chemical Technology, University of Ljubljana, Aškerčeva 5, 1000 Ljubljana, Slovenia
[d]Charles University in Prague, Faculty of Science, Department of Physical and Macromolecular Chemistry, Hlavova 8/2030, CZ-128 40 Prague 2 – Albertov, Czech Republic

Corr. author. Phone: +386 1 476 205; Fax: +386 1 476 03 00; E-mail: majda.zigon@ki.si

Abstract: Nanostructured polyanilines (PANI) with various morphology were synthesized by polymerization of aniline with ammonium peroxodisulfate in acidic aqueous medium containing ionic liquids (IL) with imidazolium, pyridinium and quaternary ammonium cations. The influence of the type of IL and the aniline/IL mole ratio on the morphology and properties of formed PANIs was investigated. ILs added to reaction mixture control the PANI morphology toward nanowires or various complex two- and three-dimensional structures in contrast to the morphology of agglomerated granular particles that is typical of PANIs prepared in the absence of IL. The UV-Vis, IR and Raman spectra of PANIs showed that the used ILs do not affect the chemical structure of PANI, which indicates that they do not affect the formation of PANI molecules but only their assembling during polymerization. The DLS measurements indicate that ILs as well as their mixtures with an oxidant and aniline form in 1 M HCl ordered micellar structures. The micellar structures most likely act as soft templates that assemble growing PANI chains and/or aniline molecules into particular nanostructures and/or their precursors. The fact that the structure of PANI nanoparticles is, in general, a function of the type of IL and IL/aniline concentration ratio, indicates that the architecture of micelles depends on the same variables.

KEYWORDS: Polyaniline, Nanostructures, Ionic liquids, Morphology, Soft templates.