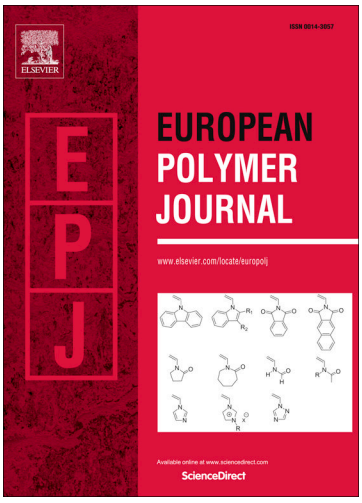

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PII: S0014-3057(17)30081-2
DOI: https://doi.org/10.1016/j.eurpolymj.2017.09.030
Reference: EPJ 8081

To appear in: *European Polymer Journal*

Received Date: 17 January 2017
Revised Date: 30 August 2017
Accepted Date: 20 September 2017

Please cite this article as: McCoy, C.P., Irwin, N.J., Hardy, J.G., Kennedy, S.J., Donnelly, L., Cowley, J.F., Andrews, G.P., Pentlavalli, S., Systematic optimization of poly(vinyl chloride) surface modification with an aromatic thiol, *European Polymer Journal* (2017), doi: https://doi.org/10.1016/j.eurpolymj.2017.09.030

Systematic optimization of poly(vinyl chloride) surface modification with an aromatic thiol

Colin P. McCoy*, Nicola J. Irwin, John G. Hardy[a], Susan J. Kennedy, Louise Donnelly, John F. Cowley, Gavin P. Andrews, Sreekanth Pentlavalli

School of Pharmacy, Queen's University Belfast, Belfast BT9 7BL, UK

[a]Department of Chemistry, Lancaster University, Lancaster, Lancashire, UK

*Corresponding author

Tel: +44 (0) 2890972081; Fax: +44 (0) 2890247794; Email:c.mccoy@qub.ac.uk

Abstract

The efficient covalent functionalization of poly(vinyl chloride) (PVC), which is widely used in medical device manufacture, allows an array of potential property-enhancing surface modifications to be made. To demonstrate a general method of functionalization *via* substituted (functional) thiols, we describe a systematic approach to the optimization of PVC surface modification by nucleophilic substitution with 4-aminothiophenol through control of reaction conditions: solvent composition, sonication, reaction time and presence of base and/or phase transfer catalyst (PTC). Efficient thiol attachment was confirmed using solid-state NMR and Raman spectroscopies, and the extent of surface modification was quantified using ATR-FTIR spectroscopy. Sonicated samples exhibited a lower degree of modification than their statically immersed counterparts (21.7 vs 99.6 μg cm^{-3}), and mechanical integrity was compromised. In DMSO/H_2O systems with a PTC, resultant degrees of PVC surface modification were up to 12.5% higher when caesium carbonate was employed as the base than in corresponding systems with potassium carbonate.

Keywords

PVC, thiol, nucleophilic substitution, surface modification