

Abstract

Nanocomposite Hydrogels Based on Poly(*N*-vinyl pyrrolidone) [†]

Alice Ionela Podaru ^{1,2}, Gabriela Toader ¹, Stefania Paula Stoleriu ², Paul Octavian Stanescu ²,
Raluca Elena Ginghina ³  and Mircea Teodorescu ^{2,*} 

¹ Faculty of Integrated Weapon Systems and Engineering, “Ferdinand I” Military Technical Academy, 39–49 G. Cosbuc Blvd., 050141 Bucharest, Romania; podaru.alice04@gmail.com (A.I.P.); gabriela.toader@mta.ro (G.T.)

² Faculty of Applied Chemistry and Materials Science, Polytechnic University of Bucharest, 1–7 Gh. Polizu Street, Bldg. A, 011061 Bucharest, Romania; stefania.stoleriu@upb.ro (S.P.S.); paul.stanescu@upb.ro (P.O.S.)

³ Research and Innovation Centre for CBRN Defence and Ecology, 225 Olteniței Ave., 041309 Bucharest, Romania; ginghinaraluca@gmail.com

* Correspondence: mircea.teodorescu@upb.ro

[†] Presented at the 17th International Symposium “Priorities of Chemistry for a Sustainable Development” PRIOCHEM, Bucharest, Romania, 27–29 October 2021.

Abstract: Poly(*N*-vinyl pyrrolidone) (PNVP) is one of the most studied and recognized polymer for use in the pharmaceutical industry and medicine purposes due to its unique combination of highly essential properties such as nontoxicity, biocompatibility with human tissue, chemical stability, and good solubility in water and other solvents. Most of the PNVP-based hydrogels are characterized by low mechanical properties when handled in a swollen state. For this purpose, several methods have been reported to increase the mechanical properties of these gels by introducing an inorganic clay as a reinforcing agent. The present work deals with the preparation and detailed structural characterization of nanocomposite hydrogels based on amidic *N*-vinyl pyrrolidone (NVP) monomers with or without *N,N*-methylenebis(acrylamide) (MBA) as chemical crosslinker and different concentrations of Laponite XLG as reinforcing agent. The hydrogels were synthesized by the radical polymerization of the monomers using 2,2-azobisisobutyronitrile (AIBN) as the initiator. In this study, we evaluated the structure of PNVP-based nanocomposites by using FT-IR, their morphology through SEM-EDX, and the influence of different amounts of Laponite XLG on the final properties, by performing rheological measurements and swelling studies. The Laponite XLG, used as reinforcing agent, significantly contributed to the improvement in the mechanical properties of the nanocomposite hydrogels.

Keywords: hydrogels; poly(*N*-vinyl pyrrolidone); reinforcing agent; nanocomposite; nano-clay



Citation: Podaru, A.I.; Toader, G.; Stoleriu, S.P.; Stanescu, P.O.; Ginghina, R.E.; Teodorescu, M. Nanocomposite Hydrogels Based on Poly(*N*-vinyl pyrrolidone). *Chem. Proc.* **2022**, *7*, 82. <https://doi.org/10.3390/chemproc2022007082>

Academic Editors: Mihaela Doni, Florin Oancea, Zina Vuluga and Radu Claudiu Fierăscu

Published: 28 June 2022

Publisher’s Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.