Lecture Notes in Mechanical Engineering • Pages 613 - 619 • 2023 • 5th International Conference on Advances in Manufacturing and Materials Engineering, ICAMME 2022 • KualaLumpur • 9 August 2022through 10 August 2022 • Code 294689

Document type
Conference Paper

Source type
Book Series

ISSN
21954356

ISBN
978-981199508-8

DOI
10.1007/978-981-19-9509-5_81

Publisher
Springer Science and Business Media Deutschland GmbH

Original language
English

Volume Editors
Maleque M.A., Ahmad Azhar A.Z., Sarifuddin N., Syed Shaharuddin S.I., Mohd Ali A., Abdul Halim N.F.

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Investigation of Microgels and Double Crosslinked Microgels Containing 2-Carboxyethyl Acrylate (CEA)

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Abstract

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Abstract

In this work, a new pH-responsive microgel (MGs) containing 2-carboxyethyl acrylate (CEA) as a comonomer. MGs were synthesized by emulsion polymerization and denoted as CEAX, whereby X shows different CEA content in MGs. These MGs samples were denoted as CEA14, CEA21 and CEA28. The CEA MGs were vinyl-functionalized with GMA and used to prepare three DX MGs gels denoted as DX CEA21, DX CEA28 and a blended system that contained both CEA21 and CEA28 to observe the effect of a binary system. The latter system is denoted as DX BL-CEA. The z-average diameters (d_z) obtained

from DLS measurements for these three systems are 39 nm for CEA14, 84 nm for CEA21 and 255 nm for CEA28. The performance of the gels was further studied by rheology analysis and from rheology, G' values decreased in the order: DX MAA (70.2 kPa) > DX BL-CEA (37.3 kPa) > DX CEA28 (34.5 kPa) > DX CEA21 (4.68 kPa). The MG size increased strongly with increased CEA content used to prepare the MGs. The modulus (E) value of the blend system was remarkably very close to the DX CEA28 gel indicating that CEA28 distributed more stress within these blend gels. The ductility of DX CEA gels was greater than the established DX MAA gels. The data in this study are the first example of DX MGs prepared using a carboxylic acid monomer other than MAA.

Author keywords

CEA; Hydrogels; pH-responsive microgels; Polymerization

Indexed keywords

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