

L-Alanine induced thermally stable self-healing guar gum hydrogel as potential drug vehicle for sustained release of hydrophilic drug

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Hydrogels are 3D polymeric networks, which are hydrophilic and cross-linked via covalent or non-covalent interactions. Because of their soft nature with similar physical properties to soft tissues attracts more attention in biomedical application but due to its weak mechanical strength and non-healable nature, its application are still restricted in biomedical field. This article introduces a simple approach of preparing self-healable guar gum-graft-acrylic acid (GG-PAA) hydrogel using L-alanine for the first time as a cross-linking agent which alters various properties of hydrogel such as mechanical strength ($G' = 90,570 \text{ Pa}$). A series of guar gum (GG) based hydrogel were synthesized by

varying the concentration of L-alanine (from 0.4-1% w/v) which was used as a cross-linking agent. Hydrogel was characterized by HRSEM and rheology studies which explore the morphology and mechanical strength of hydrogel; further it was investigated that synthesized GG based hydrogel showed good swelling ability with excellent self-healing property. The highly water soluble drugs have a tendency to burst rapidly into human body which is undesirable and thus, this hydrogel may be helpful to overcome this problem too and found fruitful applications in biomedical field.

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