

Supporting Information

Impact of Nanoclay on the pH-Responsiveness and Biodegradable Behavior of Biopolymer-Based Nanocomposite Hydrogels

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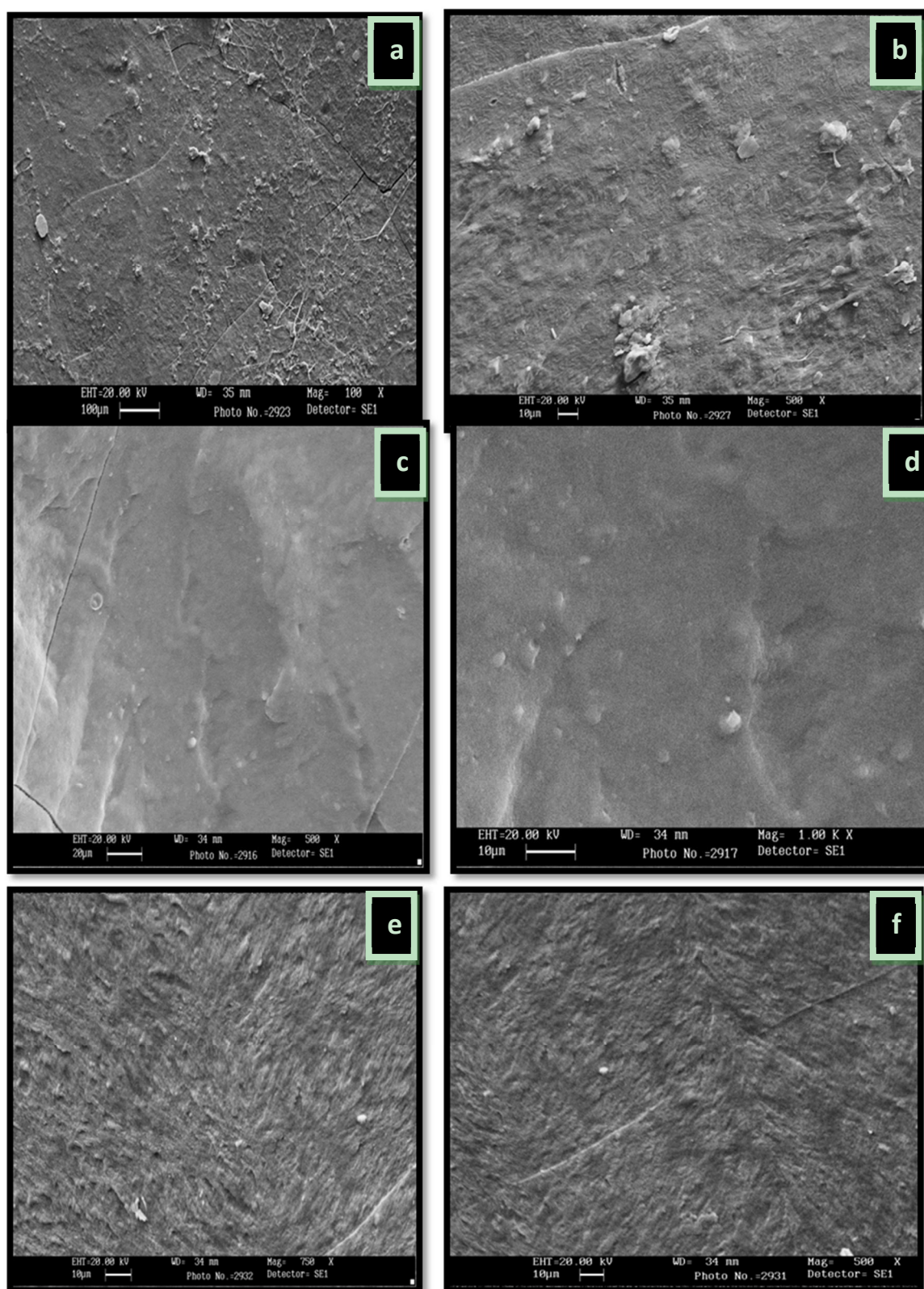


Figure S1. SEM micrographs of CG-0 (a and b), CGP2-3 (c and d) and CGP2-5, (e and f) dried hydrogels.

TGA analysis:

A 10 wt% loss occurred within the range of temperature 150 °C - 200 °C, due to loss of imbibed solvent molecules from the hydrogels. The 50 wt% loss occurred in the temperature range of 370 °C to 400 °C. This may be attributed to the decomposition of ether and amide linkages. The third weight loss occurred in the temperature range 450 °C -480 °C and beyond this point, the degradation continues up to 700 °C. The enhanced thermal stability of hydrogels CGP2-1 to CGP2-5, as imparted by polyol induced cross linking is evident by the increase in degradation temperature of these hydrogels. The enhanced thermal stability of CGP2-5 in comparison to other ratios can be attributed to the formation of highly cross linked network containing more amount of polyol, which act as a cross linking agent, thus, enhancing the stability of the hydrogel network.

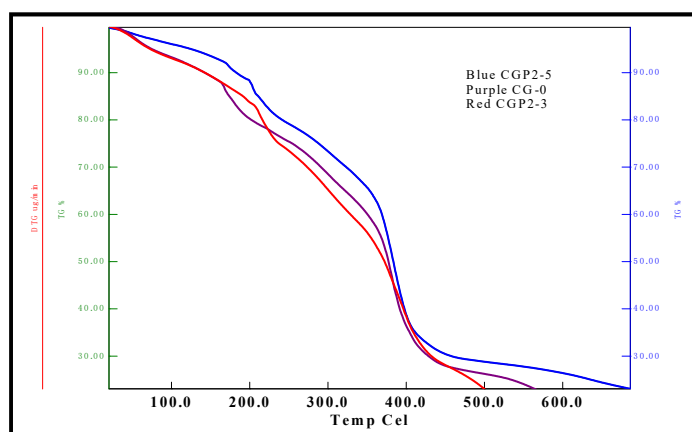


Figure S2. TGA analysis of CGP2-5, CG-0 and CGP2-3 hydrogels.

DSC analysis: The glass transition temperature was observed in the temperature range 45-50° with enthalpy relaxation.³⁷ The composition CGP2-3 and CGP2-5 exhibits exothermic peaks around 225-250°C as well as at around 400°C. A shift in exothermic peaks to higher temperatures was observed for CGP2-5 and CGP2-7 prepared with a higher concentration of polyol. These results indicate that the energy needed for the fusion of polymer increased with an increase in cross-linking, and support the fact that an increase in cross-linking increases the polymer chain rigidity and hence, higher energy is required to break the highly cross-linked polymer than the loose network.

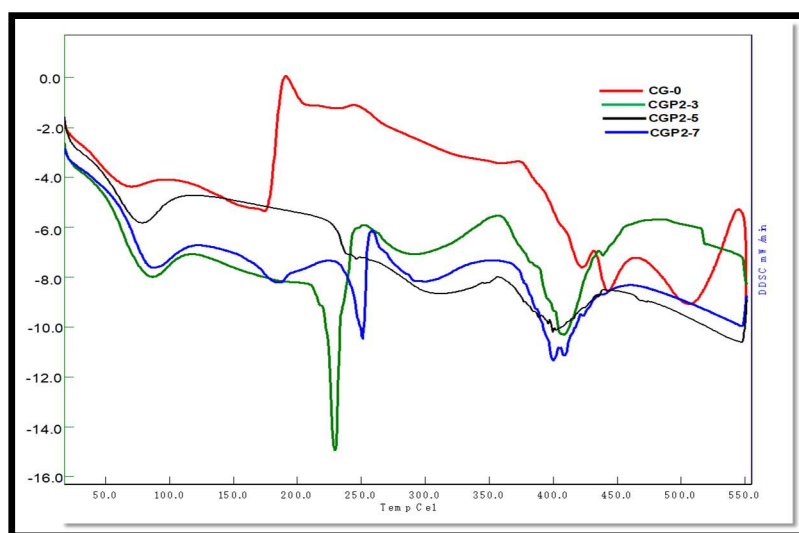


Figure S3. DSC micrographs of CH-guargum-polyol hydrogels.

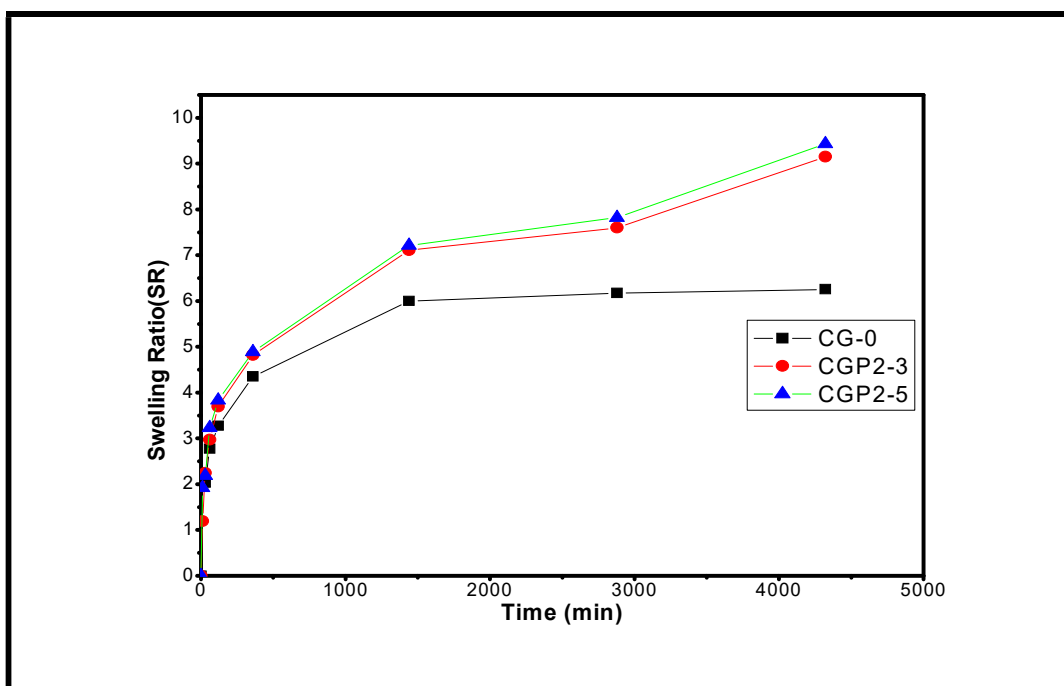


Figure S4. Swelling ratio of CG-0, CGP2-3 and CGP2-5 at pH 7.4.

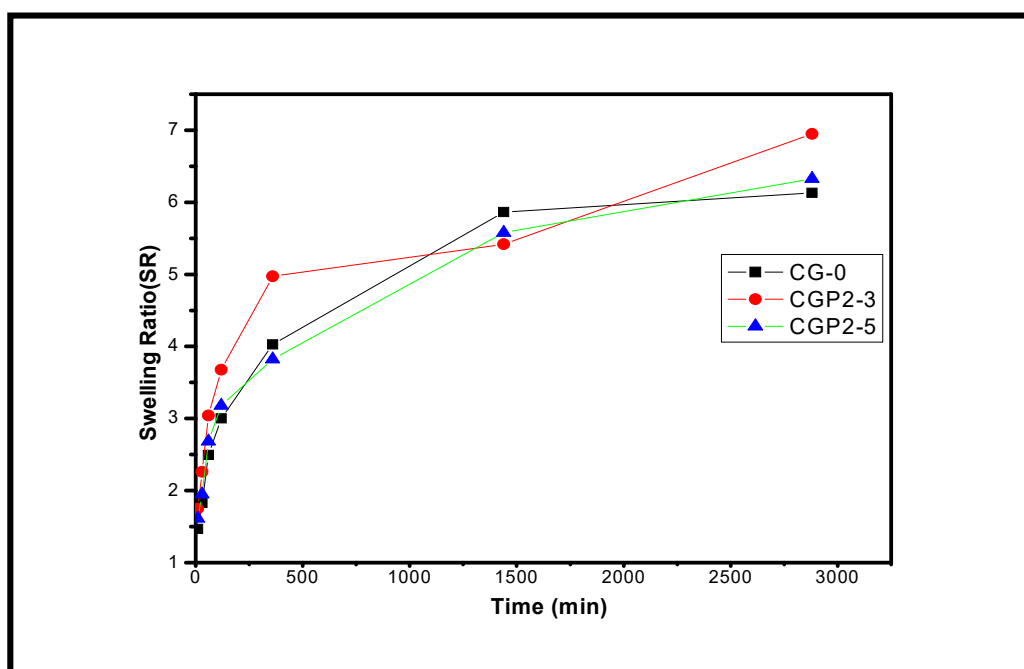


Figure S5. Swelling ratio of CG-0, CGP2-3 and CGP2-5 at pH 4.

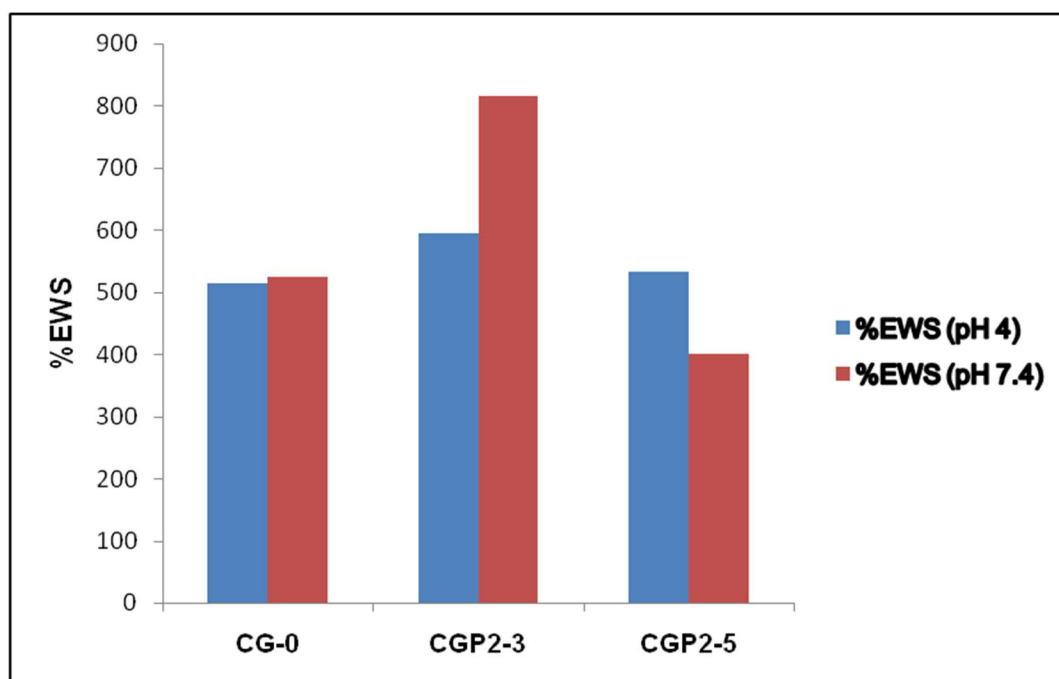


Figure S6. % EWS and pH relationship in pH 4 and pH 7.4 buffer solutions.

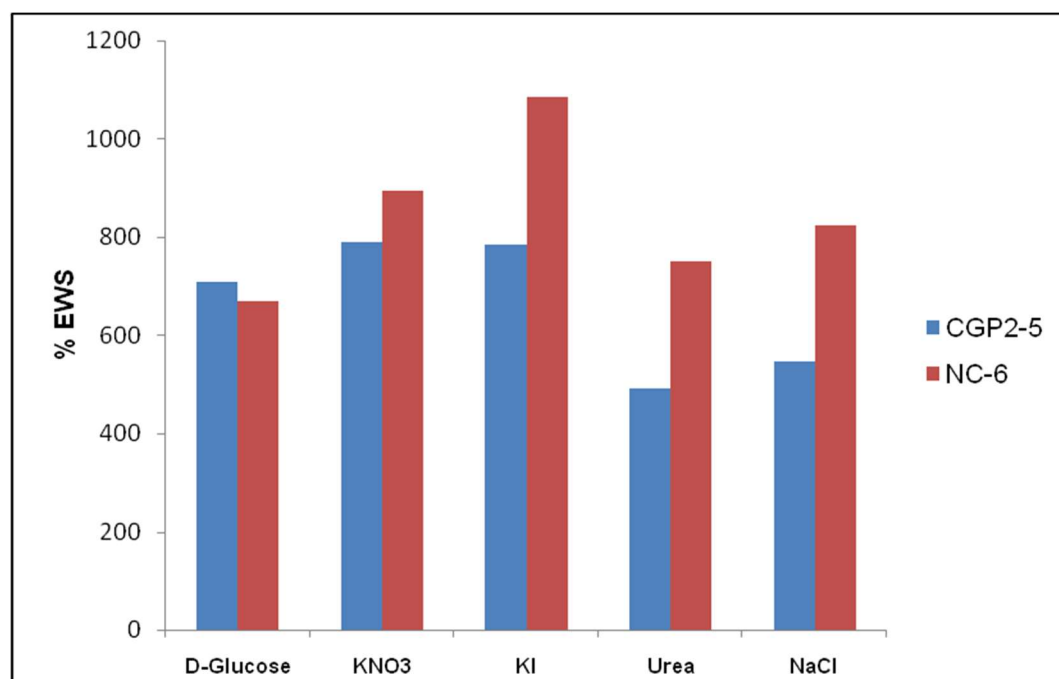


Figure S7. Effect of physiological solutions on %EWS of CGP2-5 and NC-6 hydrogels.

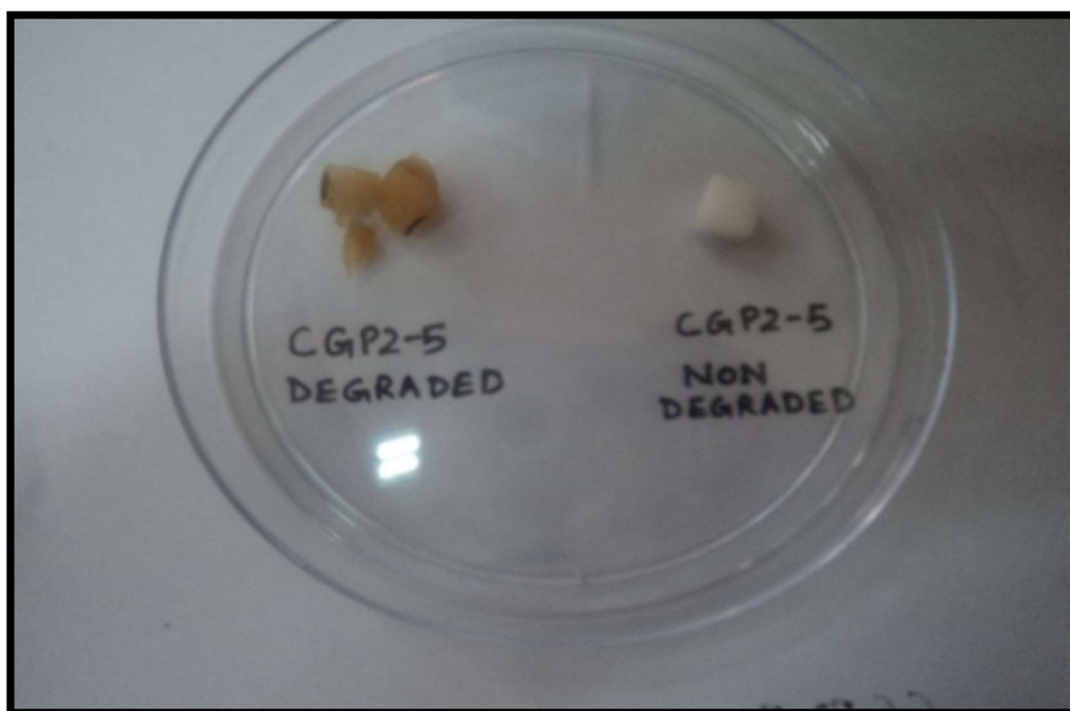


Figure S8. Digital picture of CGP2-5 hydrogel before and after the soil burial degradation study.