**ABSTRACT**

In this study, poly (N-cyclohexylacrylamide-co-acrylamide/sodium 2-acrylamido-2-methyl propanesulfonate) gold nanocomposite hydrogels were synthesized by free-radical copolymerization in methanol/water at 60 °C. The gold nanocomposites hydrogels were prepared via in situ polymerization using gold nanoparticle. The weight percentage of N-cyclohexylacrylamide (NCA) and acrylamide (AM) monomers was fixed 50:50 and the weight of sodium 2-acrylamido-2-methylpropanesulfonate (AMPSNa) was varied from 0.1 to 0.5 g. The swelling behavior of gold nanocomposite hydrogels was studied by gravimetric method and it was found that swelling increases as the amount of sodium 2-acrylamido-2-methylpropanesulfonate increases. The surface morphology study indicates the formation of spherical shaped gold nanoparticle in the polymer matrix.