Synthesis and Characterization of Crosslinked (NIPA-*co*-AAc) Copolymer as a Thermoresponsive Nanohydrogel

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Poly (*N*-isopropylacrylamide) (PNIPA) is the most popular synthetic polymer among the thermoresponsive polymers since it displays a sharp phase transition close to 32^{o}C **[1,2].** The crosslinked hydrogels obtained from this polymer swell under the LCST and shrink above it. When *N*-isopropylacrylamide (NIPA) copolymerized with other hydrophilic monomers with specific functional group such as acrylamide **[3]** and *N*-(hydroxymethyl) acrylamide **[4]** the obtained co-polymeric hydrogel may have better hydrophilicity and site-specific function compared to PNIPA itself. So that the applications of such gel usually involve the chemical modification of poly (NIPA). These modifications are usually performed to introduce functional groups that can increase the LCST towards body temperature to improve the mechanical properties **[5,6,7]**. So the thermoresponsive polymeric nanogels have been synthesized by inverse microemulsion polymerization of *N*-isopropylacrylamide (NIPA) and acrylic acid (AAc) in our study.

Microemulsions are thermodynamically stable mixtures of water, oil and surfactant that exhibit either a discrete micro droplet or a bicontinuous sponge-like structure. Most usually direct (o/w) or inverse (w/o) microemulsions are used for the synthesis of ultra small polymer particles. These nanoparticles are typically characterized by diameters between 5 and 100 nm, a narrow size distribution, and a small number of polymer chains per particle **[8]**. The synthesized nanogels were characterized by FTIR, 1HNMR, TEM.

References:

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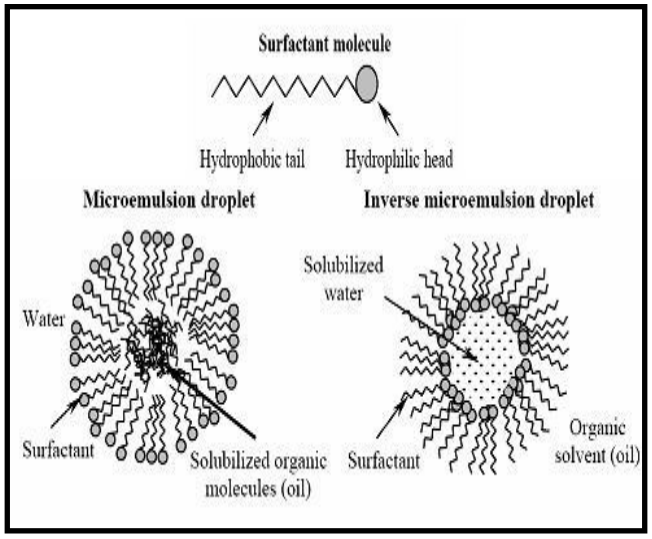

Figure (1): schematic diagram of micelles and microemulsions

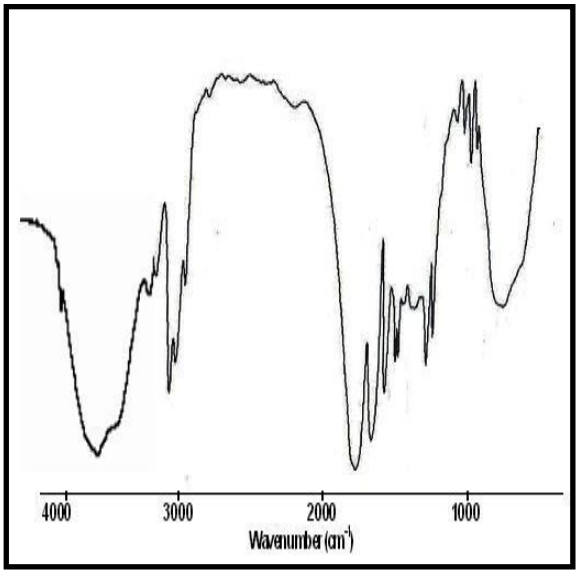

Figure (2): IR-Spectra of synthesized nanohydogel

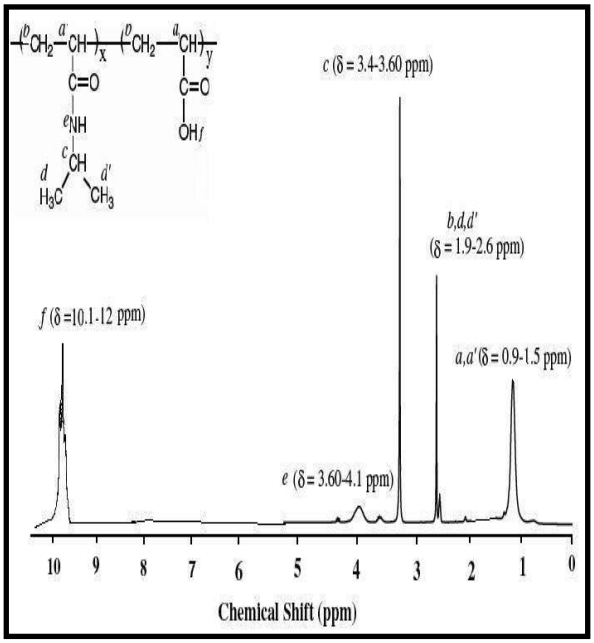

Figure (3): ^{1}HNMR-Spectra of synthesized nanohydogel

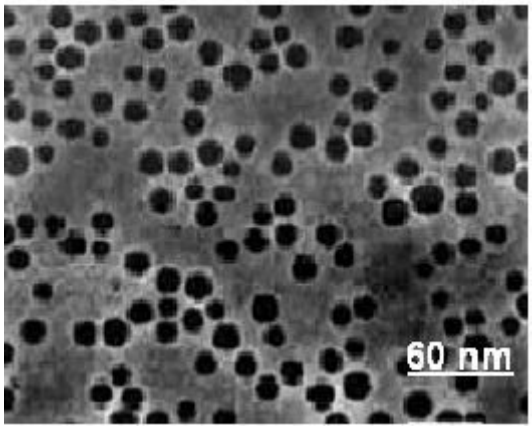

Figure (4): TEM of synthesized nanohydogel