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Synthesis and super-swelling behavior of a novel low salt-sensitive protein-based superabsorbent hydrogel: collagen-g-poly(AMPS)

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Abstract: Superabsorbent polymers are obtained by the graft copolymerization of 2-acrylamido-2-methylpropanesulfonic acid (AMPS) monomer onto collagen, using ammonium persulfate as a free radical initiator in the presence of methylene bisacrylamide as a crosslinker. Infrared spectroscopy and TGA thermal analysis were carried out to confirm the chemical structure of the hydrogel. Moreover, morphology of the samples was examined by scanning electron microscopy (SEM). The effect of reaction variables on swelling capacity was investigated to achieve a hydrogel with improved water absorbency. Under the optimized conditions concluded, maximum capacity of swelling in distilled water was found to be 268 g/g. The swelling ratio in various salt solutions was investigated in detail. Since this hydrogel exhibited a very high absorptivity in saline, it may be referred to as a low salt-sensitive superabsorbent. The collagen-g-AMPS hydrogel also showed cation exchange properties. The swelling kinetics of the synthesized hydrogels with various particle sizes was also preliminarily investigated.

Key Words: Collagen, hydrogel, swelling, 2-acrylamido-2-methylpropanesulfonic acid

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