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Electrospun Carboxymethyl Sago Starch/Poly (Ethylene Oxide) (CMSS/PEO) Hydrogel Nanofiber

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Abstract. Sago starch is one of the natural polymers with great values as a polymeric device for various applications due to its potential as biocompatible materials. Producing sago starch nanofibers could enhance the efficiency of sago starch due to its large surface area per volume. Electrospinning is a technique that able to produce micro- to nano-scale fibers, cost effective and applicable to a large variety of materials. In present study, the sago starch was modified into carboxymethyl sago starch (CMSS) prior electrospun into nanofibers to improve properties of the sago starch, such as solubility in cold water. Carboxymethyl sago starch/poly (ethylene oxide) (CMSS/PEO) composite nanofibers were prepared using electrospinning technique with various CMSS/PEO blend solution concentrations from 2.5 to 10.0 w/v%. CMSS/PEO hydrogel films were also prepared and studied for comparison. The SEM results show the increasing of concentration of CMSS/PEO solution mixture, the formation of bead in the nanofibers reduced significantly. It indicates that the incorporation of PEO could reduce the formation of beads of the nanofibers. The electrospun fiber diameter is in the range of 300 nm to 1 μ m with random orientation. The CMSS/PEO hydrogel nanofibers were successfully prepared by crosslinked using a non-toxic and natural component, citric acid. The crosslinking reaction was optimized by varying the ratio of PEO to CMS percentage of citric acid (w/w), crosslinking temperature and crosslinking period to get the highest swelling ratio of the hydrogel nanofiber. The optimized swelling ratio of CMSS/PEO hydrogel for each parameter varied from 9.442 to 5.649. The CMSS/PEO hydrogels was evaluated for the possible use in drug delivery systems. In this respect, the release properties of methylene blue (MB) indicator, as a drug model, was investigated.

Keywords: Carboxymethyl Sago Starch, Nanofiber, Hydrogel nanofiber, Poly(ethylene oxide), Methylene blue