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One-Step Synthesis of Hyaluronic Acid-Based (Sub)micron Hydrogel Particles: Process Optimization and Preliminary Characterization

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Abstract: Hyaluronic acid (HA)-based (sub)micron hydrogel particles were synthesized by crosslinking virgin HA with divinyl sulfone (DVS) in sodium bis(2-ethylhexyl)sulfosuccinate (AOT) reverse micelle systems under basic conditions. Experimental parameters including HA molecular weight, solution concentration, and reaction time were systematically varied in order to obtain well defined hydrogel particles. The use of a cosurfactant, 1-heptanol (1-HP), had a profound effect on the reaction kinetics and the particle morphology. The resulting particles exhibit negative charges on their surfaces. In vitro biocompatibility study indicates that these particles do not cause severe death to the cultured fibroblasts. These HA-based hydrogel particles are promising candidates for use in drug delivery.

Key Words: Hyaluronic acid; (Sub)micron particles; Drug delivery; Biomaterials; Biodegradable polymer; Microgel; Nanogels

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