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Fabrication of antimicrobial packaging materials using natural polymers by coaxial-electrospray

Current environment pollution forces people to find the ideal food packaging material needs to be abundant in nature, cheap and nontoxic while natural polymers are macromolecules from plants, animals, and microbes. Polysaccharides such as alginate, chitosan, galactomannans, starch, and pectin are common natural polymers. However, due to their weak in mechanical and thermal properties they are usually used in combinations to exhibit enhanced properties. Among all of the encapsulation techniques, coaxial electro-spraying is a hydrodynamic process, in which high voltage is applied to two or three liquids separately perfused through individual coaxial capillary needles. Coaxial electro-spraying provides the possibility of fabrication of bioactive compounds incorporated polymeric particles with minimized contact of the core and shell solution during the fabrication process. This study will focus on fabricating antimicrobial packaging materials using natural polymers through coaxial electro-spraying technology to fabricate active packaging material to preserve fruit from environment. The essential oils, thymol and carvacrol at the ratio of 1:1, will be used as the antimicrobial agent while Water Soluble yellow mustard mucilage (WSM) and starch particles are used as wall materials. The result shows the generated nanoparticle is excellent in encapsulation efficiency for 84.17%. Great release kinetics as it could have less than 30% release in the first 10 hours. It has been revealed that nanoparticle fabricated by coaxial electrospray can be an ideal solution for cherry tomato preservation.