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## Antioxidant Activities and Properties of Quercetin Nanoparticles-Incorporated Cellulose-based Packaging Films

As a natural-derived phenolic compound, quercetin has promisingly strong antioxidant activities. It is possible to incorporate this compound with active packaging film. However quercetin has poor water-solubility resulting in a limitation of its antioxidant efficacy. Nanotechnology is one of the innovative technologies that can increase surface area, bioactivity, and also improve the solubility of the active substance. This work aimed at investigating the antioxidant activities of quercetin nanoparticles (QC-NPs) produced by rapid expansion of a subcritical solution into liquid solvents (RESOLV) technique. The QC-NPs were incorporated into cellulose-based films, methyl cellulose (MC) with polyethylene glycol having a molecular weight of 400 (PEG-400) as a plasticizer by casting technique. The particle size of QC-NPs was evaluated by dynamics light scattering (DLS) and transmission electron microscopy (TEM). The antioxidant activities of quercetin nanoparticles were evaluated by the 2,2-diphenyl-1-picrylhydrazyl assay, 2,2'-azino-bis (3-ethylbenzthiazoline-6-sulphonic acid assay, ferric reducing antioxidant power assay, and  $\beta$ -carotene bleaching assay, respectively. Some properties of the QC-NPs incorporated cellulose-based films including color, thickness, tensile strength and elongation at break will also be reported. The results also indicated that the functional properties of cellulose-based films could be enhanced by an incorporation of QC-NPs.

Keywords: Active Packaging, Antioxidant Activity, Nanoparticles, Quercetin, RESOLV

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