

Composite film based on chitosan and epigallocatechin gallate grafted chitosan: Characterization, antioxidant and antimicrobial activities

ABSTRACT

The effect of chitosan-epigallocatechin gallate conjugate (CS-EGCG) at various ratios (10:0, 9:1, 8:2, 7:3, 6:4 and 5:5, w/w) and glycerol (30 and 50%, w/w) on mechanical, barrier and optical properties of CS films and CS/CS-EGCG composite films was studied. CS films added with 30 or 50% glycerol (CS-30G or CS-50G, respectively) had high tensile strength and elongation at break. Generally, CS/CS-EGCG composite films had higher resistance to light transmission than CS films ($p < 0.05$). With augmenting concentrations of CS-EGCG, films with lower lightness (L^*) and higher redness (a^*) and yellowness (b^*) were obtained. Therefore, among composite films, those with CS/CS-EGCG ratio of 8:2, containing 30 or 50% glycerol, were selected for further analyses in comparison to CS films. Composite films, regardless of glycerol levels, showed higher antioxidant and antimicrobial activities as compared to CS films ($p < 0.05$). Overall, CS/CS-EGCG (8:2) composite films had satisfactory physical properties with increased antimicrobial and antioxidant activities and could serve as promising packaging for food shelf-life extension.