ABSTRACT

Starch-based plastics endorse the use of renewable materials to replace petroleum-based plastics. Although starch is a cheap, abundantly available, and biodegradable raw material, the poor mechanical properties of starch-based bioplastic films due to their increased hydrophilicity, limit its industrial application as packaging material. To eradicate the downsides of starch-based plastics, a novel, biobased crosslinking agent: oxidized sucrose was synthesized to crosslink starch chains and blended with polyvinyl alcohol following reinforcement with $AgNO_3$. Crosslinking is one of the most striking methods to improve the mechanical properties of starch films. Oxidation inserts multiple carbonyl groups in the sucrose structure enabling it to cross-link starch chains. The mechanical properties of bioplastic films such as tensile strength, tensile strain and breaking energy were analyzed to assess the cross-linking effects of oxidized sucrose. Maximum tensile strength of 20.51 MPa with elongation of 78% and breaking force of 77.95 N was obtained which surpassed the crosslinking results of other crosslinking agents reported in the literature.