

## Starch and Chitosan Derivatives as Additives for Thermoplastic starch-based Blown Films

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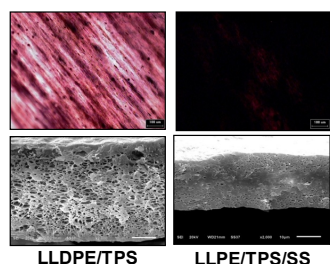
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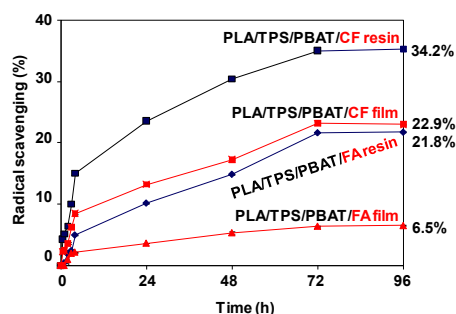
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Starch and chitosan are two naturally abundant bio-based polymers, mostly found in plants and crustaceans, respectively. Both are polysaccharides consisting of glucose units for starch and glucosamine units for chitosan, in which the hydroxyl and amino groups are available for chemical modification to yield various derivatives appropriate for different applications. This presentation will demonstrate the syntheses and the feasible utilizations of two polysaccharide derivatives, i.e. starch stearate (SS) and chitosan ferulate (CF), as functional additives for thermoplastic starch-based blown films. SS could improve compatibility between thermoplastic starch (TPS) and polyethylene (PE) phases, resulting in improved tensile properties as well as water vapor and oxygen barrier properties of the TPS/PE blend film. Grafting ferulic acid onto chitosan provided CF, which was water soluble and possessed higher antioxidant activity than chitosan. This chemical grafting could reduce the loss of ferulic acid during incorporating into TPS/poly(lactic acid)/poly(butylene adipate-co-terephthalate) (TPS/PLA/PBAT) blown film. Incorporation of CF caused improved oxygen barrier property and antioxidant activity of the TPS/PLA/PBAT blend film. The results indicated that SS could be potentially used as a compatibilizer for TPS/PE blend film, while CF could be applied as an antioxidant for active TPS/PLA/PBAT blend film, respectively.

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LM (top) and SEM images (bottom) of LLDPE/TPS (left) and LLPE/TPS/SS blend films (right).



Radical scavenging of PLA/TPS/PBAT/CF versus PLA/TPS/PBAT/FA resins and films.

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