

Abstract

Biodegradable and Transparent PVA/Starch-Based Composite Films for Wound Dressing Applications [†]

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Abstract: Industrial plastic production has the significant benefits of convenience, safety, and low cost. Further to the benefits are added the aesthetic qualities, the mechanical strength and the capability to mix with other materials such as fibers. All these contributed to the rapid expansion of plastics (polystyrene and nylon) in multiple applications and various purposes, such as biomedical materials, packaging, transport, industry, and agriculture. On the other hand, global warming is now one of the most concerning issues for all people. It is considered that replacing some of the conventional materials in various applications such as wound dressings with biodegradable starch-based films is a step forward in addressing environmental issues. Due to mechanical debridging of tissues, traditional dressings like regular cotton gauzes are counterproductive and end up causing painful wound trauma during dressing procedures. The development of transparent wound dressing films enables a moist healing environment with enhanced bacterial impermeability. The performance of polyvinyl alcohol/starch/citric acid (PVA/St/CA) based composite film for wound dressing applications is addressed in this work. Literature recorded fixed composition of PVA (2.5 w/w%), starch (2.5 w/w%), and glycerol (2 w/w%) during 70–80 °C casting temperature. Different citric acid concentrations (0.5 to 2 g) were investigated during the development of composite film solution casting. Prepared samples have been characterized by swelling index, solubility-dependent biodegradability, and tensile strength (TS). The film also exhibits enhanced combinations of the water vapor transmission rate and antibacterial efficiency against the bacterial flora (various bacteria existent in the air). As an extra benefit, such materials are easily degraded in water for up to seven days with a minute footprint. A potential candidate for wound dressing applications has been inferred from the biodegradable PVA/St/CA films with all these useful features.

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