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Bio-digestion and composting as end of use options for Ag films

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Agricultural films for use as greenhouse covers, mulch films and silage film are a film market in excess of 350 million pounds in North America. There is a large recycling market for these films after their use in agriculture but much of these films still end up in landfill or as litter.This paper will discuss the physical properties of various biopolymers in relationship to the application needs of agricultural mulch films. The ability to recycle, compost or bio-digest these biopolymer based mulch films will be discussed in relation to their petroleum based counterparts that are presently used.The focus will be on the use of the biopolymer film waste as a replacement or a supplement to the use of and need for food waste in composting and biogas production.The percentage of food waste in the raw materials to be composted or anaerobically digested directly effects the time necessary for composting and the speed of biogas production. With food waste supplies and sources being variable, the use of biopolymer based agricultural films as a supplement to the food waste could add predictability and increased production to the composting and biogas industries.

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ZnO reinforced PHBV (polyhydroxybutyrate-co-valerate) nanocomposites

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Although polyhydroxyalkanoates (PHAs) are promising candidates for future bio-based packaging, some properties of these polymers currently limit their industrialization. Especially for the polymers intended for food packaging exhibiting good gas barrier properties is essential since the polymeric material is expected to preserve food from microbial and chemical spoilage during its shelf life. For the purpose of decreasing oxygen permeability of polyhdroxybutyrate-co-valerate (PHBV, a biopolymer from PHA family) nanocomposites were produced by the incorporation of rod-shaped ZnOnano-crystals. ZnO crystals with varying size and aspect ratios were synthesized in our lab by chemical precipitation method. PHBV/ZnO nanocomposites of different compositions were produced by melt-extrusion method. The effects of ZnO particles and their aspect ratios on the oxygen barrier property of the composites were investigated. Compatibility of permeability change with changing aspect ratio to the models in the literature like Nielsen and Bharadwaj were investigated. Nanocomposites were also characterized structurally using SEM, FT-IR and XRD techniques.

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