

FORMULATION AND PROCESSING OF HIGHLY-TRANSPARENT PROTEIN/STARCH-BASED BIOPLASTICS

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Egg white albumen is a protein from which, under adequate processing conditions, a highly-transparent and tough biodegradable material can be obtained. However, its current applications are limited by its high cost. With the goal of achieving cost-competitive biomass-derived materials for the plastics industry, the incorporation of two different types of starch (corn and potato) to a base formulation of albumen and glycerol was considered. In order to study the effect of processing on the mechanical and optical properties of albumen/starch-based bioplastics, three different procedures were followed: i) compression-moulding-based manufacture, ii) extrusion, and iii) combination of both. Dynamic bending (DMTA) and tensile tests, along with %-transmittance measurements demonstrated that the resulting material properties strongly depend upon the selected procedure and its processing conditions. Thus, compression-moulding (method i) after blending the ingredients by kneading was seen to produce much more promising results, concerning material transparency and strength, if compared to extrusion (method ii). However, results can further be improved by adequately extruding starch and glycerol before blending with the protein (method iii).