

## **Development of Polylactic Acid (PLA) based Biodegradable Packaging Materials**

**Dhanushka M.K.D.T, Kaushalya R.A.N.C and Samarasekara A.M.P.B\***

*Department of Materials Science and Engineering, University of Moratuwa, Sri Lanka*

*\*email: banduamp@gmail.com*

The key purpose of packaging is to protect the contents or products from external factors. Synthetic polymers do not degrade completely in nature after the usage and create environmental issues. Therefore, there is a tendency to substitute such polymers with natural polymers that are easily biodegraded and less likely to cause environmental pollution.

The main objective of this research is to develop a biodegradable packaging material based on Polylactic Acid (PLA) and locally extracted starch. Starch was extracted from cassava tubers by crushing, blending and sedimentation processes. The extracted product was characterized by Fourier Transform Infrared Spectroscopic technique (FTIR). Experimental results indicated that 25 wt.% of starch could be extracted from the cassava that was tested.

Biodegradable PLA and starch-based blends were prepared by adding starch as the main additive. The dried starch was incorporated into the PLA and melt-blended using laboratory scale internal mixer. A mixing process was performed for various starch concentrations. The blended samples were then pressed to form thin sheets in a hydraulic press. Soil burial test was performed to analyze the biodegradability of the developed product. The tensile strength and elongation at break of the samples were determined by tensile testing. Weight loss in starch-containing samples gradually increased with time during the soil burial test. Experimental results also indicated that biodegradability of the products increased as the starch content is increased. The mechanical properties such as tensile strength and elongation also decreased as the starch content increased. These results indicated that the addition of starch to PLA is a better method to increase the biodegradability of the PLA–starch blends. These developed biodegradable materials can be used as a sustainable material to create safer environment.

**Keywords:** *Biodegradable, PLA, Starch, Packaging Material*

---