PROCESSING AND PROPERTIES OF STARCH ESTER-BASED THERMOPLASTIC COMPOSITIONS

Klaudija Cerkaite[1], Ayodeji Amobonye[1], Joana Bendoraitiene[1], Dovile Liudvinaviciute[1], Muhammad Nasif[1], Laura Peciulyte[1], Deimante Rosliuk[1], Remo Merijs Meri[2], Shu-Kai Yeh[3]

[1]Kaunas University of Technology, Department of Polymer Chemistry and Technology, Lithuania
[2]Riga Technical University, Institute of Chemistry and Chemical Technology, Latvia
[3]National Taiwan University of Science and Technology, Department of Materials Science and Engineering, Taiwan
klaudija.cerkaite@ktu.edu

As worldwide demand for energy and consumer products continues to rise, the need for renewable resources to meet these requirements becomes increasingly urgent. For this reason, researchers are focusing on abundant, sustainable materials and exploring how they can be modified to replace products currently derived from non renewable sources. Among these materials, starch stands out as a major area of interest because it is plentiful, renewable, inexpensive, and easy to chemically and physically alter. However, the potential of natural starch to replace conventional plastics is limited because of being too hydrophilic, having poor mechanical properties and dimensional stability. By replacing the hydroxyl groups of starch with ester groups the hydrophobicity of molecules can be increased and number of hydrogen bondings reduced, thus increasing the molecular mobility and decreasing glass transition temperature of the polymer. Moreover, by incorporating plasticizers, this polymer can withstand extrusion process and can be shaped into various products.

In this study, thermoplastic starch esters were synthesized, mixed with plasticizer (polyethylene glycol or triacetin) and processed using twin-screw extrusion. The influence of the plasticizer and extrusion parameters on the properties of extrudates were evaluated.

Acknowledgements

This work was supported by the Project of Scientific Cooperation Program between Latvia, Lithuania, and Taiwan and received funding from the Research Council of Lithuania (LMTLT), agreement No S-LLT-25-4.