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## **SOLID-STATE $^1\text{H}$ NMR STUDY OF CORNSTARCH PLASTICIZED WITH UREA AND GLYCEROL DURING AGEING**

*Wednesday, 9 September 2020 15:50 (30 minutes)*

Thermoplastic starch, a group of starch-based materials, has often been under review because it can be used as low-cost bioplastics. Native starch is usually processed under the action of high temperature and shear stress with addition of plasticizers such as low molecular weight polyols and/or amide-containing molecules to obtain a moldable thermoplastic material. Such materials are sensitive to ageing and time dependent changes in their structure are of great importance for the use of materials in practice. In this study, solid-state magic-angle spinning  $^1\text{H}$  NMR was used to characterize structural changes in cornstarch plasticized with glycerol and urea during one-year ageing. It was found that widths of the signals related to urea and glycerol CH/CH<sub>2</sub> groups did not change significantly while widths of the signals coming from water and glycerol OH groups decreased by about half after one year of storage. This could mean that urea formed stable hydrogen bonds with starch which were not affected too much during storage whereas hydrogen bonds between glycerol OH groups and urea were disrupted which resulted in increased mobility of glycerol and perhaps also phase separation of glycerol and water during ageing.

**Presenter:** ŠMÍDOVÁ N. (Department of Physics, Faculty of Electrical Engineering and Informatics, Technical University of Košice)

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