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Reinforcing effect of poly-furfuryl alcohol on freeze-dried micro-fibrillated cellulose foamsEva-Marieke Lems¹, Stefan Winklehner¹, Wolfgang Gindl-Altmutter¹ and Christian Hansmann²¹University of Natural Resources and Life Sciences, Austria²Wood K-Plus, Austria

Lightweight foams are of general interest in a diversity of applications because of their low density and high specific surface area. Since there is a special interest to replace fossil-based polymers with polymers from renewable and biodegradable resources, cellulose nanofibrils and lignocellulosic nanofibrils were used to prepare bio-based foams, which could be used for insulating materials. For the preparation of the porous materials, lignin-free bleached wood pulp, termed MFC and microfibrillated cellulose with 17% lignin content (MFLC) were used in aqueous suspensions. Furfuryl alcohol and maleic anhydride were added to the slurry, resulting in ratios of fibrils to furfuryl alcohol of 0.00, 0.03, 0.06, 0.11, 0.20, 0.33 and 0.50. After mixing with a high-shear blender, the mixtures were placed in an oven at 80 °C for 24 hours in order to polymerize the furfuryl alcohol. Thereafter, foams were prepared by freeze-drying. Characterization of the foams was performed by Scanning Electron Microscopy (SEM), ATR-Fourier Transform Infrared Spectroscopy (FTIR), Thermo-Gravimetric Analysis (TGA) and as well as mechanical testing (e.g. compression tests). Furfuryl alcohol content was found to significantly affect the foam density. Furthermore, mechanical properties were significantly higher for MFLC-based foams.

Biography

Eva-Marieke Lems has obtained her Master's degree in Biomaterials Science and Technology from University of Natural Resources and Life Sciences, Austria in 2017. Presently she is pursuing her PhD with the thesis entitled "Lignocellulosic materials and their application possibilities".

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