

Changes in the surface of textile fibres due to mechanical stress

Jana Novotná¹, Senta Müllerová²

Technical University of Liberec, Dep. Of Material Engineering, Studentská 2, 46117 Liberec, Czech Republic

e-mail: jana.novotna3@tul.cz

² Technical University of Liberec, Dep. Of Material Engineering, Studentská 2, 46117 Liberec, Czech Republic

e-mail: senta.mullerova@tul.cz

Abstract: During the processing of textile structures, damage and breakage of fibres can occur due to dynamic forces during production and also due to surface abrasion between fibres and between fibres and machine parts. These fibre deformations also occur during the wearing and maintenance of textile materials. In this study, we focus on the surface changes of three types of fibres. Polyester (PET) was selected from man-made synthetic polymer fibers and Lyocell (CLY) from man-made natural polymer fibers. Among the natural fibers, cotton (CO) was chosen. A new type of ball mill for high energy Emax milling was used to simulate the mechanical stress. Thanks to the chosen milling technology in closed vessels under defined conditions, it was possible to evaluate and analyze all particles and free fibers that occurred during mechanical abrasion. The fibres were then subjected to SEM analysis.

Keywords: polyester, lyocell, cotton, milling, fiber surface, microplastic

ACKNOWLEDGEMENT: INTER-ACTION project number LUAUS23054 title Microplastics released from textiles in aquatic ecosystems: identification, characterisation and effect assessment.

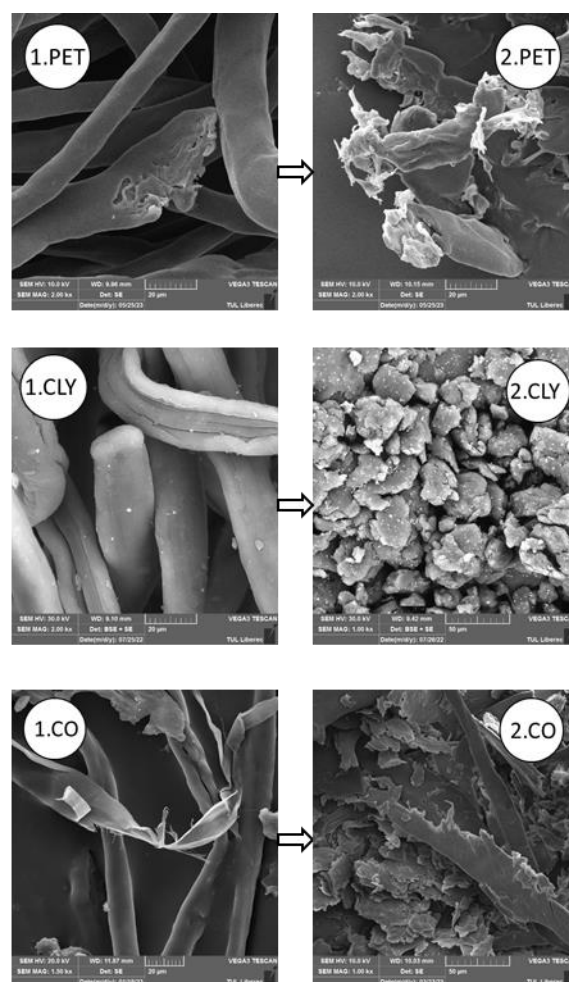


Figure 3 SEM photos of milled fibers: 1.PET (5min. milled), 2. PET (30min. milled), 1.CLY (5min. milled), 2. CLY (30min. milled) 1.CO (5min. milled), 2. CO (30min. milled)