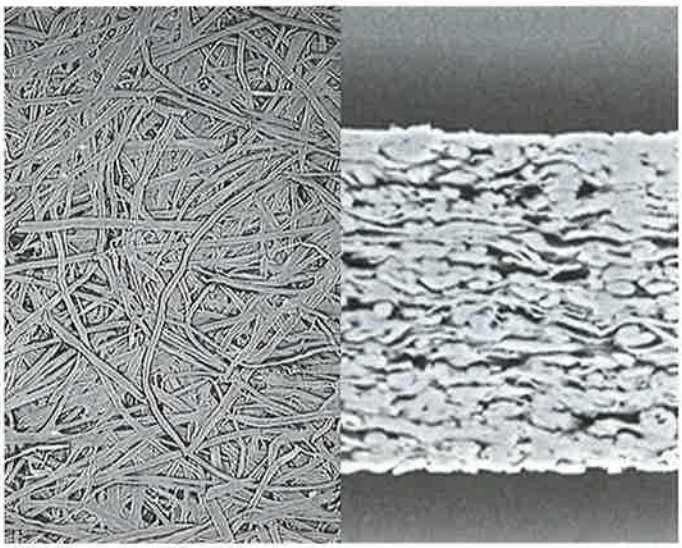

Abb. 1: Papieroberfläche (links) und Papierblatt-Querschnitt (rechts) im Elektronenmikroskop

Fig. 1: Electron micrograph of paper surface (left) and paper sheet cross section (right)

ink solvent also the active ink ingredients may penetrate into the porous structures of the substrate surface. This may be acceptable for graphic printing, as the «function» of light absorption by the printed dye is not or only slightly impaired by this process. The production of of contiguous functional layers for printed electronics is almost impossible using usual absorptive substrates. However, there is a solution for the case that the printing ink is a dispersion of at least fairly hard particles: the pore size at the substrate surface should be constructed to be smaller than the particle size in the printing ink. The challenge for paper substrates in this case is to lower the pore size of a raw uncoated paper of several µm to a range of even as low as 10 nm for e.g. printing of ink jet inks containing functional nanoparticles.

**SPECIAL COATED PAPER GRADES FOR PRINTED ELEKTRONICS.** As discussed, conventional paper grades, even high-end grades for graphic printing, are generally not fit for use as substrates for printed electronics. Schoeller Technocell therefore employs various coating technologies to meet the manifold challenges for substrates for printed electronics.

**ACTIVE POLYVALENT PACKAGING BASED ON ENVIRONMENTALLY FRIENDLY FIBRE MATERIAL.** ACTIPOLY is a two year ERA-NET CORNET project which has recently started in May 2015. The goal of the project is the development of a novel fibre-based thermo-formable packaging material with barrier and antimicrobial functionalities intended to extend the shelf life of fresh food. Focus will be also set on recyclability and compostability of the packaging material after usage. The innovative core element of this project is the modification of fibre-based materials to introduce thermoplasticity. This will be essential for the production of trays. Such modifications are expected to push paper and fibre-based materials into a novel class of products exhibiting extraordinary properties where nearly no eco-friendly solutions are yet available on the market. Further development steps will include barrier functionalities for moisture and $O_2$ impermeability optimized for thermo-processing and also antimicrobial coatings, both intended to preserve the freshness and edibility of the packaging good and thus extending shelf life. Additionally, a bio-based barrier top film with antimicrobial properties will be developed, which is sealable on the fibre-based tray. The total packaging concept is aimed to be recyclable and compostable. The main part of the project is the chemical modification of the functional groups of cellulose to create a fibre-material with thermoplastic properties. For this purpose, the hydrophilic cellulose will be partially converted to a hydrophobic material to introduce ductile properties. The degree of substitution is a central question of research in terms of the balance of hydrophilic and hydrophobic properties of the fibres to meet requirements of the paper making process (hydrophilic functionality) as well as the thermo-forming process (hydrophobic functionality). The ductile barrier coating with simultaneous oxygen and water vapour barrier will be realized experimentally by a multilayer approach. For the moisture barrier, hydrophobic polymers like waxes will be evaluated. The oxygen barrier will be created by the second layer. Furthermore, tensile properties of the multilayer film will be modified, using inorganic fillers. Both, the tuning of ductility and barrier functionality will be evaluated by establishing an experimental matrix. Antimicrobial coatings will be obtained by two different research methods: the use of bio-based antimicrobial agents and by the development of superhydrophobic coatings. Firstly, the incorporation of antimicrobial agents into the eco-packaging will be simultaneously evaluated following two approaches: incorporation of antimicrobial compounds using spray coatings methods or incorporation of antimicrobial compounds in the matrix via melt-processes. In parallel of these two approaches, antimicrobial activity will be obtained by the development of super-hydrophobic coatings. PTS is coordinating the project in cooperation with in total eight different partners participating in this project: Papiertechnische Stiftung (coordinator, www.ptspaper.com), CELABOR (www.celabor.be), The Association West Pomerian Cluster «Green Chemistry» (www.zielonachemia.eu), MateriaNova (www.materianova.be), Pack4Food VZW (www.pack4food.be), Sirris (www.sirris.be), The West Pomeranian University of Technology Szczecin (www. zut.edu.pl), Leibniz Institute for Agricultural Engineering (www.atb-potsdam.de).

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