

BARRIER PERFORMANCE OF POLYSACCHARIDE-COATED PAPER AND BOARD AS A FUNCTION OF THE COATING METHOD AND SUBSTRATE PROPERTIES

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Paper and board are well-established materials in packaging applications due to their easy recycling and biodegradability. Because of the hydrophilic and porous behaviour of paper, however, modifications are necessary to achieve the required barrier properties against gases, aromas, water, grease and oil necessary in e.g. packaging of food.

In conventional packaging these barrier properties are often achieved by the application of layers made from non-renewable materials such as plastic or metal films. However, these composite materials pose a significant problem for the environment and for the recyclability of fibre-based packaging materials. Naturally occurring polysaccharides, such as alginate, chitosan, nano- and microfibrillated cellulose, have shown to be good oxygen and oil barriers. The application of these materials onto paper substrates, however, poses several challenges to standard paper coating equipment because of the difference in rheological properties compared to conventional paper coating materials. For instance, biopolymers usually have a significantly higher viscosity already at low solids content.

This contribution presents our approach to investigate the principle suitability of a polysaccharide or any other biopolymer for barrier coating applications on paper. Furthermore, two different application methods are compared with respect to the resulting barrier properties of the coated papers: 1.) the application using a conventional film press, a standard coating unit in the paper industry, and 2.) the application with a purpose-built spray coating unit developed for biopolymer coatings. Additionally, the different biopolymers were applied onto different commercial base papers consisting of either virgin or recycled fiber materials to also examine the influence of both coating material and substrate properties on the resulting barrier performance, such as oxygen transmission rate, water vapour transmission rate, grease resistance and mineral oil migration and permeation.

The results will provide insights on how to best apply biopolymer-based barrier coatings in the paper and board industry and will highlight the advantages and limitations of these application methods. Furthermore, novel findings regarding the interaction between biopolymer, substrate and coating method for the desired packaging applications will be presented.

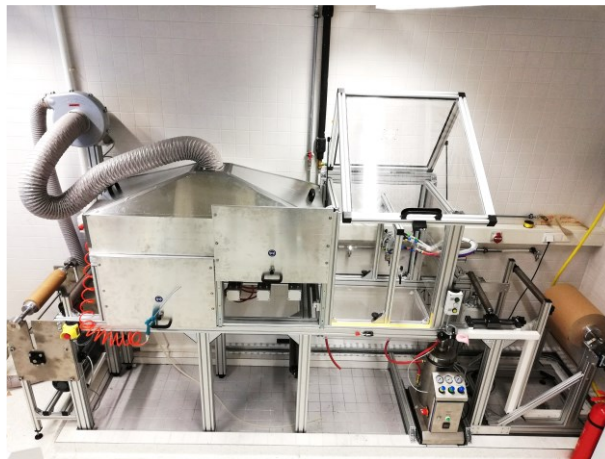


Figure 1 : Purpose-built spray coating unit at BPTI, TU Graz