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Investigations on the influence of hygroscopic surfaces on the plasma-assisted modification of polyamide

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Plasma processes constantly gain importance in plastics processing. They are influenced by production parameters and the substrate itself. The polymers' properties vary substantially depending on their processing or outer conditions. But the impact of the treated materials on plasma processes is often neglected.

The influence of water absorption on plasma processes shall be presented at the example of plasma modification of polyamide 6 (PA6). Polyamides are particularly hygroscopic, which affects a number of material and processing properties. On this account PA is for instance glued in a dried state. It has been shown that plasma treatment can be used to increase the bond strength of laminates and to incorporate oxygen and nitrogen containing functionalities [1, 2]. For atmospheric plasma processes an influence of the absorbed water on the etching of the fibres was found [3]. In which way the water absorption affects the modification of PA6 in low pressure plasma processes has been the topic of current research.

In a first step the treatment of PA6 in oxygen plasma was under investigation. The water absorption of PA6 significantly influences the plasma process and the resulting surfaces. Moist surfaces release more OH molecules to the plasma and become rougher than dry substrates in an etching process. The application of plasma pretreatment increases the adhesive properties of dry as well as moist PA6.

In terms of plasma coating of PA6, the interaction with HMDSO plasmas was examined. Using a downstream plasma, the coating's topography as well as the chemical composition are influenced by the conditioning state of the substrate.

References

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Keywords

plasma treatment

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