Session	Materials Science in Glass (II)
Date	APRIL 11, 2025
Time (CET)	11:10 - 11:25
Chair	Osman Burak Okan

Atmospheric DCSBD Plasma Technology for Surface Treatment, Activation and Adhesion Improvement of Glass for Performance Improvement of Glass Products

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Biography

Dr. Richard Krumpolec is a researcher at the R&D Centre CEPLANT at Masaryk University in Brno, Czech Republic. He is focusing on the research, development, and applications of dielectric barrier discharges for plasma surface modification, plasma-assisted deposition of thin films and plasma functionalization of materials. He was a team member of the project in which the large-area plasma processing of float glass was studied for performance improvement of laminated glass. He is the co-author of the new low-temperature 'DCSBD linear jet' plasma technology designed for plasma surface modification of complex 3D glass surfaces and glass fibres and fabrics.

Abstract

We present low-temperature atmospheric pressure plasma technology for glass surface modification and materials for glass products. Extremely high-power density and uniformity of plasma generated by diffuse coplanar surface barrier discharge (DCSBD) enables very short plasma treatment times. Even very fast plasma treatment (in-line treatment speed ~ 1-5 cm/s) results in effective surface cleaning and activation of a glass surface. The plasma-generated surface hydroxyl species, improved micro-uniformity of glass, together with changed interface properties led to improved adhesion and affected the properties of coatings deposited on DCSBD plasma-treated glass.

We will present two configurations of atmospheric DCSBD plasma, one for fast large-area surface modification of flat glass, and the second one designed for plasma modification of complex 3D surfaces (rough, structured, porous) such as glass fibres or curved automotive glasses and other components made of different materials. The application potential of DCSBD plasma technology will be presented with two examples: i) large-area plasma surface modification of float glass and example how plasma surface modification can affect the properties of deposited coatings; and ii) plasma surface activation of curved automotive glasses and ABS and PU plastic components for adhesion improvement. As will be presented, atmospheric DCSBD plasma has potential to replace the application of chemical primer and thus make the process more easier and eco-friendly.

The scalable, energy efficient and effective, low-temperature atmospheric pressure DCSBD plasma technology can be integrated into in-line production lines or in the robotic arm production processes. These characteristics together with experimental results of improved wettability, bonding, increased interfacial properties, and adhesion of plasma-treated surfaces make DCSBD plasma interesting for the production of various glass products.

Notes

This research has been supported by the project LM2023039 funded by the Ministry of Education, Youth and Sports of the Czech Republic.