

RESUPPLI

Development of high resistance superhydrophobic coating using atmospheric pressure plasma deposition.



InSPIRATION

Research and development on plasma polymerisation processes began more than 50 years ago and several successful applications have emerged over the past 20 years. From electrical, optical and biomedical films to protective coatings and selective membranes, plasma polymerised films have been widely promoted. In comparison to more conventional polymer synthesis, the use of plasma offers indeed significant advantages, such as a solvents-free deposition process and a better control of the coating thickness.

In the past few years, scientific community has introduced several superhydrophobic coatings with exceptional water repellence, for which worldwide coating industries from various economic sectors have already showed their interest. As such, an organic coating solution able to provide superhydrophobic and oleophobic surface properties using plasma polymerisation was recently patented by LIST and in 2016, a royalty-bearing licence has been granted to young Luxembourgish company, Molecular Plasma Group (MPG). Despite being of high interest for the group's customers, the valorisation of these coatings is nonetheless still limited to niche markets as the robustness of the plasma coating solution needs to be improved to reach a durability in other than a soft environment.

Innovation

In the frame of the RESUPPLI project, LIST researchers have the ambition to develop a new generation of fluorinated transparent plasma functional thin films with improved durability performances, but also to explore a new fluorine-free plasma chemistry way for superhydrophobic and oleophobic films.

Coatings will be therefore synthesised by an atmospheric pressure Dielectric Barrier Discharge plasma polymerization equipment and innovative deposition conditions will be addressed to improve adhesion, mechanical and durability properties. To assist decisions regarding the research and development activities, a monitoring through a regular survey of the environment legislation constraints on the chemical substances and of the economic aspects will also be established.

Impact

In 2016, the hydrophobic coatings production amounted to 9,500 tonnes and is expected to grow to 14,000 tonnes in 2022, with a CAGR of 5,5% between 2017 and 2022. The associated market should reach a total value of USD 2 billion by 2024 with the automotive industry as a main market with applications targeting mainly anti-corrosion, anti-icing/wetting as well as self-cleaning properties.

Over a five-six years, MPG has the ambition to catch 0,05% (1million/year) of this market. RESUPPLI is expected to actively participate to the improvement of its setting position on this promising market.

Through this collaborative and innovative project between LIST and MPG, research and development activities aim at providing the market with 2 robust superhydrophobic solutions deposited by atmospheric-pressure plasma technique and meeting the end-users market requirements.

Partners

Molecular Plasma Group (LU)

Financial Support

Fonds National de la Recherche

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