Superhydrophobic glass prepared by a large area process of surface nanoscopic texturing using a dewetted silver nano-mask

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For various applications, the property of super-hydrophobicity applied to a transparent glass is demanded. For example, in building windows, automotive or plane windshields, shower cabins or solar module front panels, an ultra-water repellent surface brings attractive functionalities such as a good vision under the rain even without wiper, antifouling effect, and easier cleaning of the glass surface. For these applications, processing of large area glass panels are needed, more than 1 m^2, while the super-hydrophobicity is obtained by a nanoscopic texturing of the surface in the range of several tens of nanometers at maximum to avoid light scattering, associated with a hydrophobic treatment [1].

In this presentation, a new process of glass nano-texturing that can be used for large area glass panels is described. We developed a multi-step process based on the use of a randomly distributed nano-mask made of a dewetted silver film, and an anisotropic plasma etching. The up-scaling of each step of the process to a large area industrial line is possible. The obtained texture consists in columnar cylindars in the range of 100 to 200 nm in diameter and 80 nm in depth (*cf.* Fig. 1). Water contact angles up to 135° have been measured, 160° for the advancing angle and the bouncing of water droplets has been observed. The durability from the point of view of various applications of such nano-textures and of the super-hydrophobic functionality will be presented. The effect of the super-hydrophobicity on the antifouling behaviour of glass panels has been studied.

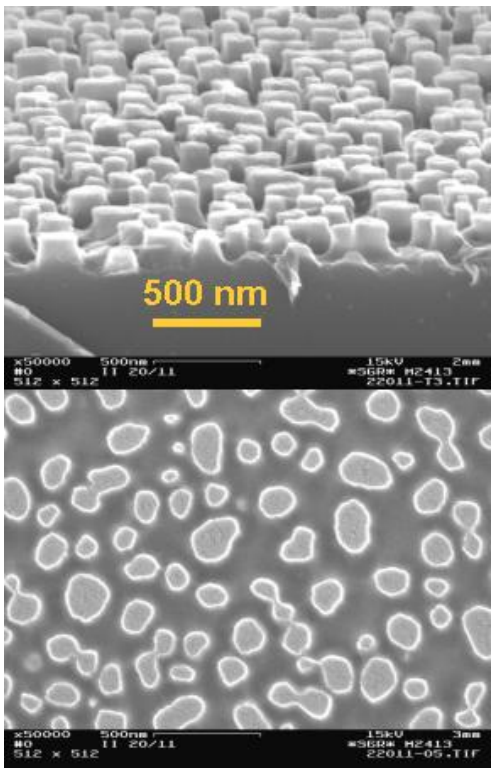

Figure 1 : SEM images of the columnar nano-texture obtained on glass panels. Tilted and top views.

Some other applications of the glass surface nanoscopic texturing have been considered, such as antireflection in the visible range, light-trapping effects or the antimicrobial function. Finally, some variations in the nano-texturing process parameters could lead to different types of textures that will be presented.

[1]. D. Quéré, Physica A: Statistical Mechanics and its Applications, Volume 313, Issues 1-2 (2002), Pages 32-46