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Publication date:
2017

Document Version
Peer reviewed version

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A creation of new engineering materials with the super-hydrophobic properties is inspired by the nature where many water-repellent surfaces in plants and animals are caused by a complex 3D micro- or nano-structures of the hydrophobic papillae (Figure 1).

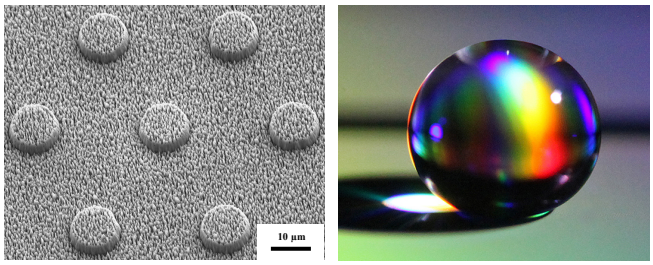

Figure 1: Hierarchical structure for superhydrophobic purposes and a water droplet on a superhydrophobic surface.

The main objective of this study is protection of surfaces from water and ice to prevent corrosion, improve aerodynamics or add self-cleaning properties to the material. To achieve this effect, the bulk materials are coated with hydrophobic polymer foils. To increase the hydrophobicity of the polymer surface, appropriate micro- and nanostructuring can be produced using a highly advanced nanolithographic method, which uses Roll-to-Roll Extrusion Coating (Figure 2). This high-speed and low cost lithography method is developed at DTU and Danapak Flexibles A/S (Murthy et al 2016; Telecka et al 2016, Okulova et.al. 2017). Coatings with different types of the micro- and nano-structures (Figure 3) can easily be fabricated for different scientific and industrial applications. The purpose of the current work is an experimental investigation of the water droplets impacting on the superhydrophobic coatings structured by the Roll-to-Roll Extrusion coating method.

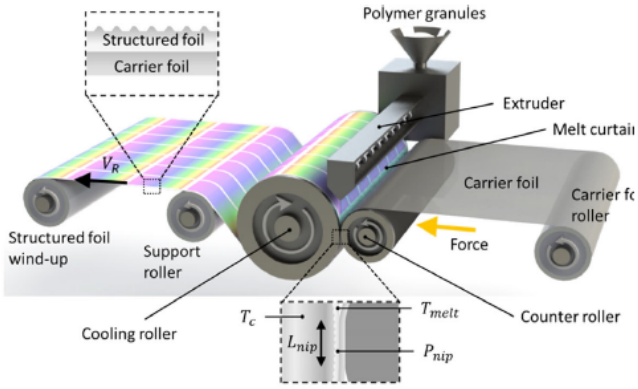

Figure 2: Roll-to-Roll Extrusion Coating Process. (Murthy et al 2016).

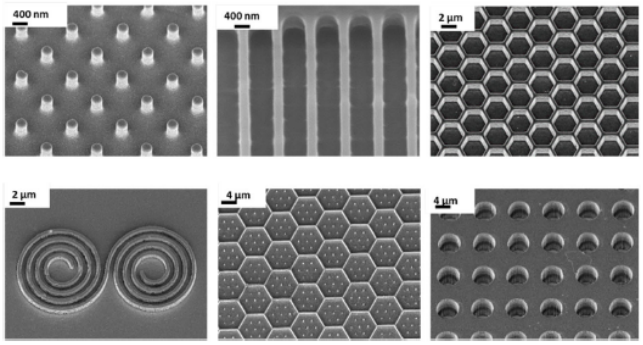

Figure 3: Examples of the nano-structures in polymer foils. (Murthy et al 2016)

Later-time dynamics (the cotact angles and the maximum spreading ratio of the droplet diameters) of the impacting droplets are measured for different Weber numbers. The maximum spreading ratios as a function of the impact Weber number found in experiments are then compared with simple analytical estimates of the maximum spreading diameter by both momentum and energy balance approaches (Wildeman et al 2016).

Funding
This work was supported by the Innovation Fund Denmark through the project XNano [grant number 4135-00142B].

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