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Editorial

Special Issue "Anti-Adhesive Surfaces"

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Research and review articles tackling the theme of antiadhesive surfaces are here collected. Material typologies under focus in the contributions soon reveal a broad variety: aluminum alloys, copper nanoneedles, titanium for implants, polymers (bulk plastics and coatings), hybrid polymer–metal systems, and even cement composites (concrete) are considered with different approaches and purposes.

This aspect reflects the magnitude of applications where the general concept of antiadhesion or low adhesion can take a specific technical significance.

Control of surface wettability is probably the most fundamental and common field of this topic, since a hindered adhesion to water (hydro-repellency or superhydrophobicity) is ubiquitously requested. On the other hand, water contact angle has been always used as an indirect, easily measurable parameter for the surface tension of a material. Over the last decade, a powerful technique for tuning such a property has been proved to be plasma nano-texturing, mostly utilized on polymers [1]. Other techniques of a different technological level, such as sanding, sand-blasting and laser ablation are explored for a superhydrophobic modification of polytetrafluoroethylene [2]. While these can be considered top-down techniques to superhydrophobicity, a bottom-up approach, instead, starting from hydrophilic building blocks, is reported in [3] showing synthesis and assembly of polypyrrole-coated copper nanoneedles.

Anti-icing behavior is another relevant performance related to low adhesivity. "Icephobicity" is strongly correlated to hydrophobicity, even though nowadays it is understood that superhydrophobicity does not automatically lead to icephobicity. Mechanisms of ice adhesion to solids are examined in [4] along with some insights in measurement methods for ice adhesion strength. An application on aluminum alloy for aerospace is presented in [5] where femtosecond laser texturing, combined with a final thermal treatment, results in an appreciable anti-icing behavior. Very recently, an interest for anti-icing properties has been expressed also in relation to concrete and other cement materials. The few studies in the literature on this topic are discussed in a review [6], reporting also a survey on more conventional and market available products/treatments developed to protect such porous materials against water penetration, hence against corrosion and deterioration phenomena.

An antibacterial action is, instead, pursued by some authors [7] working at an effective combination of the low adhesivity of a fluoropolymer coating and the antibacterial (biocidal) activity of embedded metal nanoparticles, such as copper and silver. Antibacterial action is also investigated in a contribution [8] where, revealing an even more pronounced technological effort, the attenuation of a specific oral disease, i.e., periimplantitis infection, is tested around samples of a surface-modified titanium implant.

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