Ciclo di incontri – Tavolo di discussione

SLIPPERY, LIQUID-LIKE BEHAVIOUR OF NANOTHIN GRAFTED PDMS LAYERS

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Over the past decade, a new class of anti-adhesive surfaces known as slippery covalently-attached liquid surfaces (SCALS) has emerged, characterized by low values of contact angle hysteresis (CAH, less than 5°) with water and most solvents.[1,2,3] Despite their nanoscale thickness (1 to 5 nm), SCALS exhibit behaviour similar to lubricant-infused surfaces, including high droplet mobility and ability to prevent icing, scaling,[4] and fouling.[5] Their efficacy is attributed to the liquid-like mobility of the tethered chains.[6] However, the precise physico-chemical characteristics that underpin the ultra-low CAH are unknown, making rational design of these systems impossible. In this work several synthetic methods for polydimethylsiloxane (PDMS) SCALS were reproduced, and the physicochemical properties of the resulting surfaces characterized thoroughly, including using atomic force microscopy (AFM) single-molecule force spectroscopy and neutron reflectometry to obtain information on grafted chain length, and fluorescence correlation spectroscopy to determine chain mobility. The conclusion is that the slippery properties of PDMS SCALS depends both on layer uniformity and mobility, and can be satisfactorily predicted based on the reduced grafting density of the chains.[7] If time allows, I will also discuss an application of these surfaces in atmospheric water capture.[8]

References

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