The role of superhydrophobicity in energy storage

In terms of energy, the elastic surface structure method relies on droplets as an energy storage mechanism (surface energy) during impact and recoil processes. The elasticity of the substrate increases so that the kinetic energy of the droplet is converted to surface energy and the elastic energy storage of the substrate, thereby replacing a ...

In the last few decades, natureinspired superhydrophobicity with high water repellency (water contact angle, CA greater than 150°) has been applied to metal surfaces for important applications in ...

Riblet and superhydrophobic surfaces are two typical passive control technologies used to save energy. In this study, three microstructured samples-a micro-riblet surface (RS), a superhydrophobic surface (SHS), and a novel composite surface of micro-riblets with superhydrophobicity (RSHS)-were designed to improve the drag reduction rate of water ...

Energy harvesting, Heat transfer, Nanocomposites, Ultrahydrophobicity, Lotus effect. Inspired by the "lotus effect," superhydrophobic surfaces have been engineered to repel water with unparalleled efficiency. 1 ...

Despite considerable success in design and preparation of superhydrophobic particles, a facile and low-cost approach to develop multifunctional particles, especially microcapsules with the integrated performances of intrinsically long-lasting and highly stable superhydrophobicity and other passive/active functionalities, remains extremely challenging and is still in its infancy. ...

If the superhydrophobic features can be functionalized on various metal surfaces, it will be significant and beneficial in many industrial applications for saving energy and energy storage . For example, it can drag reduction, anti-fouling, ...

Superhydrophobicity is the tendency of a surface to repel water drops. A surface is qualified as a superhydrophobic surface only if the surface possesses a high apparent contact angle (>150°), low contact angle ...

The resulting microcapsules (MCs) possess concurrent features of superhydrophobicity and thermal energy storage. Against thermal attack up to approximately 240 °C, the microstructure of MCs is nearly intact to avoid an obvious leakage of encapsulated PCM at high temperature, and meanwhile superhydrophobicity of MCs is enhanced unexpectedly to ...

Fast Self-Healing Superhydrophobic Thermal Energy Storage Coatings Fabricated by Bio-Based Beeswax and Artificially Cultivated Diatom Frustules. ... (111) Substrates with Different Pore Sizes: The Role of Interfacial

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Hydrogen Bonds. The Journal of Physical Chemistry C 2021 ... Superhydrophobicity and Rapid Rebounding Induced via a Unique ...

The interaction of biomaterials with the immune system is ruled by the action of macrophages. The surface features of these biomaterials, like wettability, which is an expression of chemical composition, texture, and geometry, can affect macrophages response. Such surface parameters can be then efficiently exploited to improve biocompatibility by lowering undesired ...

Superhydrophobicity is a surface phenomenon that indicates a very low affinity to water, and, in turn, the surface is very difficult to be wetted. A generally accepted definition of superhydrophobicity is to have a water contact angle above 150° and a start-rolling angle lower than 10° at room temperature and ambient pressure.

For the coating surface after storage, the surface free energy of alkane chains presented in the outermost layer can be as low as 24 ... the coating surface can be completely transformed from as-sprayed superhydrophilicity to superhydrophobicity after atmospheric storage, with a contact angle of 150.8 ± 0.5° and a sliding angle of 5.8 ± 1.3 ...

Apart from the superhydrophobicity of laser patterned surfaces, the durability of nanolaser-treated superhydrophobhic AA2024, Ti64 and aluminium alloy substrates have been studied by various researchers [29, 30] ...

There were different opinions on what happened during UV-treatment and dark storage. ... if the adsorption of airborne hydrocarbons at micro/nanostructured metal surfaces plays an important role in their superhydrophobicity, ... The results showed that surface morphology, surface roughness and surface energy play critical roles for the ...

This study explores the influence of wettability surfaces on cavitation inception and evolution in high-speed centrifugal pumps used for thermal energy storage and transfer systems through numerical simulations.

During atmospheric storage, the coating surface spontaneously adsorbed low surface free energy substances, mainly carboxylates containing alkane chain and alkanes, resulting in the transition of ...

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