

New approaches for engineering superhydrophobic-superhydrophilic surfaces

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ABSTRACT

Over the last decades, it has been demonstrated that micro-nanostructuring of the solid-state materials is a powerful tool for developing surfaces with controlled hydrophobicity/hydrophilicity. The research has been inspired by nature, in particular by the so-called “lotus effect” describing a superhydrophobic state with antiadhesive properties allowing water droplets to bounce on a lotus leaf. Development of superhydrophobic surfaces with designed adhesion prove to be important for various applications such as self-cleaning, deicing, vapor condensation / water collection, controlled droplet transportation etc. We used combined top-down and bottom-up technological approaches for engineering micro-nanostructured surfaces with controlled hydrophobic-hydrophilic characteristics. In this work, promising hybrid solid-state nanomaterials consisting of hydrophobic and hydrophilic components will be demonstrated. Besides, we will address the prospects for using the developed nanomaterials for the purpose of manufacturing mini-bioreactors to study living cells in specific confined conditions as well as artificial membranes resembling the membranes of living cells.