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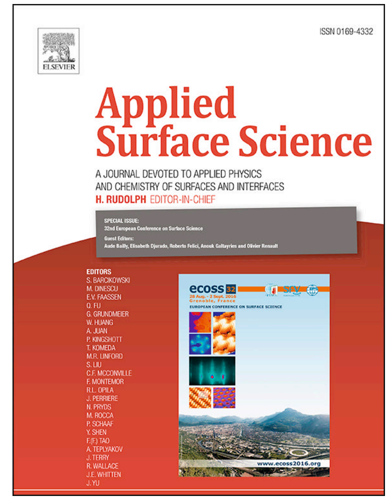

Short Communication

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Construction of robust superhydrophobic film combing povidone iodine for high efficient self-cleaning and durable bactericidal properties

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Abstract:

Bacteria can easily colonize on the biomaterials surface which leads to biofilm formation and serious bacterial infections. In this work, a new raspberry structured core-shell nanoparticles were developed through two-step emulsion polymerization method. Robust superhydrophobic film formed on the substrate showed both high efficient self-cleaning and bactericidal properties.

Keywords: Superhydrophobic; povidone iodine; self-cleaning; bactericidal; antibacterials

Bacterial adhesion on biomaterials surface is the first but one of the most crucial steps for biofilm formation and bacterial infections development[1, 2]. Antifouling surfaces mainly rely on the formation of a hydrated barrier which prevents bacterial adhesion with hydrophobic surfaces through grafting surfaces with hydrophilic or zwitterionic polymers[3, 4]. However, the antibacterial coatings are destined to be adhered by bacteria when mediated by various pollutants in the environment such as fibrin, fibrinogen, fibronectin and other proteins in human body fluid promote bacterial adhesion on implants[5, 6]. Inspired by natural surfaces with micro and nanostructures, such as plant leaves, insect wings, shark skin and gecko foot etc. the water-repellent behavior is believed to resist fouling contamination[7, 8]. Both surface energy and suitably large roughness are essential factors for construction of a superhydrophobic surface[9]. In this way, various techniques including lithography, vapor deposition and template method etc. have been extensively developed over the past decade[10-12]. In comparison, casting hard colloidal particles into coating for high roughness is more economical and simple than other preparation methods[13]. It is an appealing alternative approach to create a novel superhydrophobic surface with a water contact larger than 150°, which will efficient prevent the attachment of bacteria[8, 12]. Most importantly, the stability of the bio-inspired surface is the decisive factor for the long-term fouling resistance function[14]. For example, the Wang group[15] has recently developed superhydrophobic surface with hierarchical architecture and bimetallic composition using a facile galvanic replacement reaction method. The obtained superhydrophobic surface naturally allowed for a minimal bacterial adhesion in the dry environment, which could be