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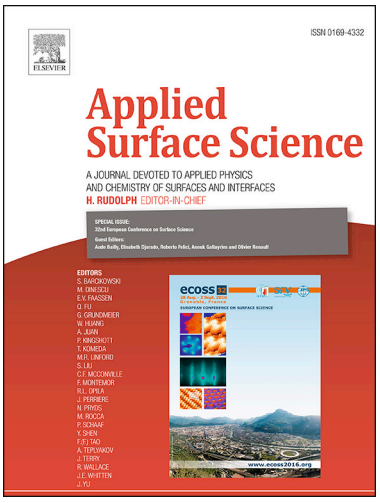

Full Length Article

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Guang Yang, Jialu Song, Xianghui Hou

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Fabrication of highly hydrophobic two-component thermosetting polyurethane surfaces with silica nanoparticles

[1]*Guang Yang,* [1]*Jialu Song,* [2]*Xianghui Hou*

[1]Key Laboratory of Aerospace Materials and Performance (Ministry of Education), School of Materials Science and Engineering, Beihang University, Beijing 100191, China

[2]Faculty of Engineering, University of Nottingham, University Park, Nottingham NG7 2RD, UK

Corresponding Author: Guang Yang*

*E-mail: yangguang@buaa.edu.cn

Abstract

Highly hydrophobic thermosetting polyurethane (TSU) surfaces with micro-nano hierarchical structures were developed by a simple process combined with sandpaper templates and nano-silica embellishment. Sandpapers with grit sizes varying from 240 to 7000 grit were used to obtain micro-scale roughness on an intrinsic hydrophilic TSU surface. The surface wettability was investigated by contact angle measurement. It was found that the largest contact angle of the TSU surface without nanoparticles at 102 ± 3 ° was obtained when the template was 240-grit sandpaper and the molding progress started after 45 min curing of TSU. Silica nanoparticles modified with polydimethylsiloxane were scattered onto the surfaces of both the polymer and the template to construct the desirable nanostructures. The influences of the morphology, surface composition and the silica content on the TSU surface wettability were studied by scanning electron microscopy (SEM), attenuated total reflection (ATR) infrared (IR) spectroscopy, X-ray photoelectron spectroscopy (XPS) and contact angle measurements. The surface of the TSU/SiO_2 nanocomposites