



## Preparation of new superhydrophobic and highly oleophobic polyurethane coating with enhanced mechanical durability

Elahe Yousefi, Mohammad Reza Ghadimi, Setare Amirpoor, Abolghasem Dolati\*

*Department of Materials Science and Engineering, Sharif University of Technology, Azadi Ave., P.O.Box 11155-9466, Tehran, Iran.*

*Corresponding Author: dolati@sharif.edu, Tel.: +98 21 6616 5259, Fax: +98 21 66005717*

### Abstract

In this study, a noble robust superhydrophobic and highly oleophobic polyurethane (PU) - SiO<sub>2</sub> nanoparticle (NP) coating is specially designed using sol-gel process. For this purpose the effective parameters on surface tension and durability of the synthesized coating investigated and optimized. This new superhydrophobic and highly oleophobic coating exhibits good pensile hardness as high as 6H with adhesive force grade of 5B and repels water and oil with contact angles (CAs) of 159° and 140°, respectively. The synthesized PU-SiO<sub>2</sub> composite also retains an excellent amphiphobicity after a 7 days immersion in water with water and oil with CAs of 150° and 130°. Facile fabrication of PU-SiO<sub>2</sub> coating with enhanced amphiphobicity and durability provides a novel pathway to the development of a high performance superamphiphobic surfaces. The outstanding properties of synthesized PU-SiO<sub>2</sub> coating are mainly due to (i) reduction of surface energy by fluoroalkylsilanes, (ii) formation of hierarchical micro- and nanometer scale roughness structures on the coating surface, (iii) stable adhesion of SiO<sub>2</sub> NPs into PU resin after cross-linking with isocyanate, and (iv) improving the chemical bonding and electrostatic interactions between film and substrate.

**Key words:** Polyurethane-SiO<sub>2</sub> composite, Superhydrophobic, Oleophobic, Robust

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