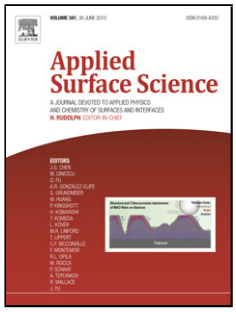

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A facile fabrication of superhydrophobic nanocomposite coating with contact angles approaching the theoretical limit

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Highlight

- A rapid and simple fabrication of superhydrophobic coatings
- Water contact angles approaching the theoretical limit (178^o)
- The stability, abrasion resistance and icing properties of the coatings

Graphical abstract

ABSTRACT

Although there are many viable approaches to induce hydrophobicity, a superhydrophobic surface could only be fabricated by combination of surface chemistry modification and roughness enhancement. In this study, surface roughness was obtained by 12 nm SiO_2 nanoparticles (NPs) which were chemically modified using a self-assembled monolayer of perfluorodecyltrichlorosilane. The SiO_2 NPs which were rendered hydrophobic, then successfully dispersed into a poly silicon (silsesquioxane) matrix at varying concentrations from 0.5 to 4%. The NPs dispersed polymer suspension was then spray coated on to glass and aluminum coupons in order to achieve polymer thin film nanocomposites. The results were revealed a superhydrophobic surface with a water contact angle exceeding 178^o with low hysteresis and bouncing water droplet behavior. Furthermore the composite film reliability (hot-humid and ice build-up) was tested in an