Functionalized SiO$_2$ nanoparticles (NPs) are highly versatile systems, which can be used for the development of tailor-made smart coatings. For example, proper functionalization and structuring of the NPs coatings may result in efficient self-cleaning films, resembling the lotus effect, although this kind of films are easily removed, because the particles are not firmly attached to the substrate. However, for exterior applications in which the system is exposed to the environment, such as in solar panels, excellent mechanical properties are also a requirement. This could be achieved by integrating such functionalized NPs into polymeric nanocomposites [1]. In this investigation, SiO$_2$ NPs were synthesized by sol-gel method, followed by in-situ functionalization with various organosilane and fluorosilane molecules. Dispersions of the functionalized SiO$_2$ NPs were used for the preparation of poly(acrylic acid) and polyurethane composite films by spin coating technique. The functionalized SiO$_2$ NPs were characterized by FTIR, XPS, AFM, and SEM. Scanning electron microscopy micrographs of the composites showed spherical SiO$_2$ NPs (~100 nm) that are embedded in a polymeric matrix. With the propose of confirm the hydrophobic effect of the SiO$_2$ NPs in the composites, the contact angle technique was used, and water contact angles up to 140º were obtained (Figure 1); water-droplet rolling up was achieved with composites based on SiO$_2$ NPs functionalized with PFOS (perfluorooctyl(trimethoxy)silane), in resemblance to the lotus effect. The optical and mechanical properties of composite were also evaluated, showing a promising behavior for its outdoor application.

![Figure 1. Water contact angle and SEM image of functionalized SiO$_2$ polymeric nanocomposite.](image)

**Keywords:** SUPERHYDROPHOBIC, NANOCOMPOSITES, SiO$_2$

**References:**


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