Nanostructured surfaces

Effect of carbon chain length of perfluorinated alkyl chlorosilanes on the surface free energy of modified surfaces

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Hydrophobic coatings, obtained by silanization of substrate material have been extensively studied for more than fifty years due to simplicity of the method and wide range of possible applications. Usually, silane layers have been deposited on silicon, glass or metal surfaces, there are few works about silanization of polymers. Resins, such as photoresist, allow for microtopography formation which is necessary to obtain superhydrophobic materials.

In the presented research we discussed the influence of modifiers carbon chain length on surface free energy (SFE) of obtained coatings. For this study we modified several different materials (epoxy resin, photoresist and silicon with glass as model substrate), using liquid phase deposition. As modifiers we used a series of perfluorinated alkyl chlorosilanes with increasing chain length, cyclohexane was used as a solvent.

Water contact angle (WCA) and contact angle hysteresis (CAH) was investigated. Topography of obtained coatings was examined using atomic force microscopy and scanning electrone microscopy. Chemical structure of deposited film was investigated using FTIR spectroscopy.

As a result of modification, strongly hydrophobic coatings on polymer substrates were obtained. Decreasing SFE with increasing chain length was observed. Also correlation between surface chemical structures and freezing of water droplet was observed.

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