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Wetting behaviour of perfluoroalkyl surfaces deposited by pulsed plasma polymerization

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Plasma polymerization of monomers with perfluoroalkyl functionalities can produce films with ultra-low surface energy, and excellent thermal and chemical stability, and have therefore found widespread use in a variety of applications. In particular, polymers with a perfluorinated C8 chain, such as 1H,1H,2H,2H-perfluorodecyl acrylate, can provide coatings with surface energies lower than 4 mJ m^{-2} – an exception level of hydrophobicity [1]. However, recent concerns about bioaccumulation of longer chain poly(fluoroalkyl acrylate)s mean that attention has now switched to the C6 analogue; 1H,1H,2H,2H-perfluorooctyl acrylate. Whilst not associated with the same environmental concerns, poly(fluoroalkyl acrylate) surfaces with perfluorinated chains consisting of six carbons or fewer are vulnerable to surface reorganization, leading to exposure of the polar acrylate groups and poor dynamic water repellency [2,3].

This work explores the role of the acrylate group in determining the chemical and physical properties of plasma polymers with C6 perfluoroalkyl functionalities. The polymer films were characterized in terms of their topography, using AFM, their chemical compositions, using XPS, and their wetting behaviours with a variety of liquids.

References:

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Keywords

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