You may never need to wash your car again thanks to new coating technology

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Dutch researchers at Eindhoven University of Technology have for the first time developed a coating with a surface that repairs itself after damage. This new coating has numerous potential applications – for example mobile phones that will remain clean from fingerprints, cars that never need to be washed, and aircraft that need less frequent repainting. The results were published in the 17 July edition of the influential scientific journal *Advanced Materials*.

Functional coatings, for example with highly water-resistant or antibacterial properties, have at their surface nano-sized molecular groups that provide these specific properties. But up to now, these molecular groups are easily and irreversibly damaged by minor contact with their surface (such as by scratching), quickly causing their properties to be lost. This has been a big limitation to the possible applications of these coatings. Researcher Catarina Esteves of the department of Chemical Engineering and Chemistry at TU/e and her colleagues have now found a solution to this problem. They have done this by developing surfaces with special 'stalks' carrying the functional chemical groups at their ends, and mixing these through the coating. If the outer surface layer is removed by scratching, the 'stalks' in the underlying layer re-orient to the new surface, thereby restoring the function.

This development can be of great importance for many applications. For example it will be possible to make a self-cleaning car, with a highly water-resistant coating that keeps this self-cleaning property for long

periods. The superficial scratches will be self-repaired and the water droplets simply roll off the car, taking dirt with them. An occasional rain shower is all that's needed to keep the car clean. In the same way, products like mobile phones, solar panels or even aircraft will remain clean for a longer time. For aircraft a cleaner surface means less air resistance, which in turn reduces fuel consumption. Other applications are contact lenses that self-repair their scratches, and coatings that resist the formation of algae, which is an advantage for ships. A limitation of the new technology is that it only works with superficial scratches that do not completely penetrate the coating.

Researcher Esteves and her team now intend to further develop this finding together with other universities and with industrial partners. She expects the first coatings to be ready for production within six to eight years, at prices comparable to those of today's coatings.

More information: The article 'Self-Replenishing Surfaces' is published in the 17 July 2012 edition of the journal *Advanced Materials*. The authors are T. Dikić, W. Ming, et al. DOI: 10.1002/adma.201200807

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