A (nano-) window that washes itself?

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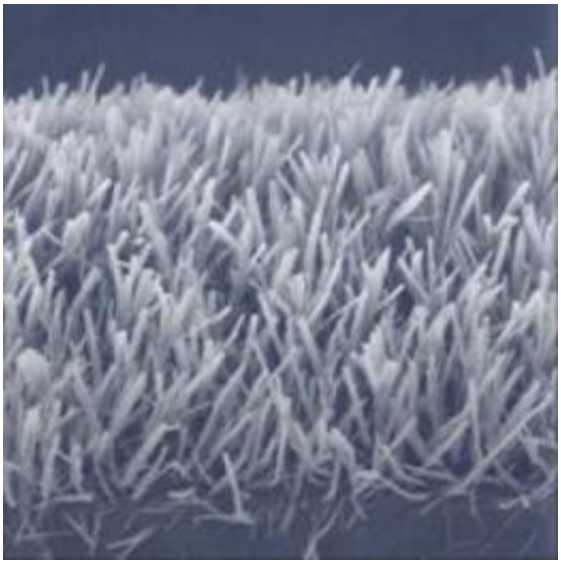

Tel Aviv University's nanosized "forest of peptides" can be used as the basis for self-cleaning windows and more efficient batteries. Credit: AFTAU

A coating on windows or solar panels that repels grime and dirt? Expanded battery storage capacities for the next electric car? New Tel Aviv University research, just published in *Nature Nanotechnology*, details a breakthrough in assembling peptides at the nano-scale level that could make these futuristic visions come true in just a few years.

Operating in the range of 100 nanometers and even smaller, graduate student Lihi Adler-Abramovich and a team working under Prof. Ehud Gazit in TAU's Department of Molecular Microbiology and Biotechnology have found a novel way to control the atoms and

molecules of peptides so that they "grow" to resemble small forests of grass. These "peptide forests" repel dust and water -- a perfect self-cleaning coating for windows or solar panels which, when dirty, become far less efficient.

"This is beautiful and protean research," says Adler-Abramovich, a Ph.D. candidate. "It began as an attempt to find a new cure for Alzheimer's disease. To our surprise, it also had implications for electric cars, solar energy and construction."

As cheap as the sweetener in your soda

A world leader in nanotechnology research, Prof. Gazit has been developing arrays of self-assembling peptides made from proteins for the past six years. His lab, in collaboration with a group led by Prof. Gil Rosenman of TAU's Faculty of Engineering, has been working on new applications for this basic science for the last two years.

Using a variety of peptides, which are as simple and inexpensive to produce as the artificial sweetener aspartame, the researchers create their "self-assembled nano-tubules" in a vacuum under high temperatures. These nano-tubules can withstand extreme heat and are resistant to water.

"We are not manufacturing the actual material but developing a basic-science technology that could lead to self-cleaning windows and more efficient energy storage devices in just a few years," says Adler-Abramovich. "As scientists, we focus on pure research. Thanks to Prof. Gazit's work on beta amyloid proteins, we were able to develop a technique that enables short peptides to 'self-assemble,' forming an entirely new kind of coating which is also a super-capacitor."

As a capacitor with unusually high energy density, the nano-tech

material could give existing electric batteries a boost -- necessary to start an electric car, go up a hill, or pass other cars and trucks on the highway. One of the limitations of the electric car is thrust, and the team thinks their research could lead to a solution to this difficult problem.

"Our technology may lead to a storage material with a high density," says Adler-Abramovich. "This is important when you need to generate a lot of energy in a short period of time. It could also be incorporated into today's lithium batteries," she adds.

Windex a thing of the past?

Coated with the new material, the sealed outer windows of skyscrapers may never need to be washed again — the TAU lab's material can repel rainwater, as well as the dust and dirt it carries. The efficiency of solar energy panels could be improved as well, as a rain shower would pull away any dust that might have accumulated on the panels. It means saving money on maintenance and cleaning, which is especially a problem in dusty deserts, where most solar farms are installed today.

The lab has already been approached to develop its coating technology commercially. And Prof. Gazit has a contract with drug mega-developer Merck to continue his work on short peptides for the treatment of Alzheimer's disease — as he had originally foreseen.

Source: Tel Aviv University (news : web)