SELF-CLEANING SOLAR PANELS ARE ON THEIR WAY

It won't be long before self-cleaning solar panels and windscreens are on sale, thanks to the PhD research of Hanne van der Kooij in the Physical Chemistry and Soft Matter chair group.

Van der Kooij studies coatings made of liquid crystals that are able to change their shape and their function with the help of electricity. You can use this to let a coating vibrate from time to time to shake off dirt and sand particles. Liquid crystals are the key. They are already incorporated in touchscreens and LCDs (liquid crystal displays). The Eindhoven researchers Dirk Broer and Danqing Liu are now using them to create coatings that can vibrate to clean windows and to make robot fingers harder or softer as needed. The liquid crystals are packed in a thin, hard layer but if you send a high-frequency alternating current through the layer, they start to vibrate.

However, the technique for making these coatings was still expensive and high on energy consumption as the Eindhoven researchers did not yet understand how exactly the electric current interacts with the material shape. That is why they approached the Physical Chemistry and Soft Matter group, as this group has the laser equipment needed to measure this interaction precisely. Van der Kooij: 'We have developed a method for very sensitive measurements of how the material changes shape under the influence of electricity.' That resulted in an article this week in the journal Nature Communications.

Van der Kooij discovered that there are three stages between applying the current and the deformation of the material. In the first stage, the liquid crystals start to vibrate very quickly, independently of one another. In the second stage, they start vibrating in sync, which makes the layer soft. This lets the coating change shape, which is the third stage. This basic information will let the scientists in Eindhoven fine-tune the interaction between the current and the crystals so that more electricity can be converted into kinetic energy. 'This will make the process more efficient and the coatings will be cheaper and consume less energy,' explains Van der Kooij.

Eindhoven University of Technology is already collaborating with a test factory in China where these dynamic coatings are manufactured. **AS**