The gecko walks on sticky pads

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As sticky as a gecko. Wageningen UR Veni-researcher Marleen Kamperman tries to stick with plastic material full of microscopic rods.

Dancing on the ceiling. Lionel Ritchie's smash hit in the eighties. The song's video clip shows him walking upside down on the ceiling. Just an illusion, of course. Flies, however, can do that, like countless other insects. Among the bigger animals, the gecko stands out as an example. It can run upside down effortlessly.

Geckos can do that because of complex structures on their feet, explains Kamperman. These are bundles of tiny hairs each ending in a sort of little flap. Hundreds of thousands of these little flaps stick to every surface by adhesion and without any other material aid. The work is done by so-called Van der Waals forces. Theoretically speaking, anyway. Kamperman says that it is not exactly clear what the mechanism is.

Not that it matters. Kamperman isn't planning to make gecko feet in exact detail. 'That won't be wise. A gecko foot is a very complex organic system. One should focus on the major issues, get to the essence of the design and copy that. This is what I'm doing now.' And this essence lies in the tiny hairs with the flaps.

Kamperman tries to capture this essence in plastic. She describes her first attempts in the latest issue of *Acta Biomaterialia*. Kamperman's gecko feet is a little plastic sheet (polydimetylsiloxane) covered with countless tiny rods which resemble studs measuring about ten micrometres in diameter. A gecko would not recognize this, but it works.

To a certain extent, that is. Kampermans' gecko skin sticks well to a base of pure silicon. But hardly any surface is as glassy smooth as that. The wheels fall off when the surface is a little rougher. 'So more is needed than just making tiny rods,' she concludes. Kamperman looks for that something extra in a higher resolution in the material: even more tiny rods. Kamperman now tries to attain that higher resolution by, for example, making rods from so-called block copolymers. These are polymers which take on a certain shape through self-assembly. In this case, it is a helix. The result is a surface densely covered with countless spirals, like a cut-open mattress. Being flexible, the spirals can make firm contact and also let go easily again. Eat your heart out, gecko!

Provided by Wageningen University