



**Sticking under Water:** Wet feet are not a problem for beetles – at least in terms of their ability to stick. Taking their inspiration from beetle feet, researchers at the Max Planck Institute for Metals Research have developed a foil that can bond to glass, even underwater. Under their soles, male leaf beetles have tiny mushroom-shaped microstructures. These are able to attach to a wall because they create a vacuum, similar to a suction cup. And this works even better underwater than it does in the air, as it is more difficult for water to penetrate into the cavities than it is for air. This makes beetles far superior to geckos – at least in terms of being able to climb underwater. Gecko feet are famous for their ability to stick, even allowing them to walk on ceilings, provided the walls are dry. This ability owes to count-

less nanometer-fine hairs under the gecko's foot. These press up against the wall without leaving any gaps, allowing the gecko to hold on thanks to the effects of van der Waals forces. These forces come about when two molecules draw very close together. The charges in the particles then shift temporarily, resulting in the generation of dipoles that attract each other like tiny magnets. In water, the molecules cannot get close enough to each other, and this already very weak force is significantly reduced. As a result, adhesive materials modeled on gecko feet with tiny, fine hairs lose their adhesion under water. The new material, however, which emulates beetle feet, means that sticking without an adhesive agent is now possible even under water.

PHOTO: S.N. GORB – MPI FOR METALS RESEARCH

