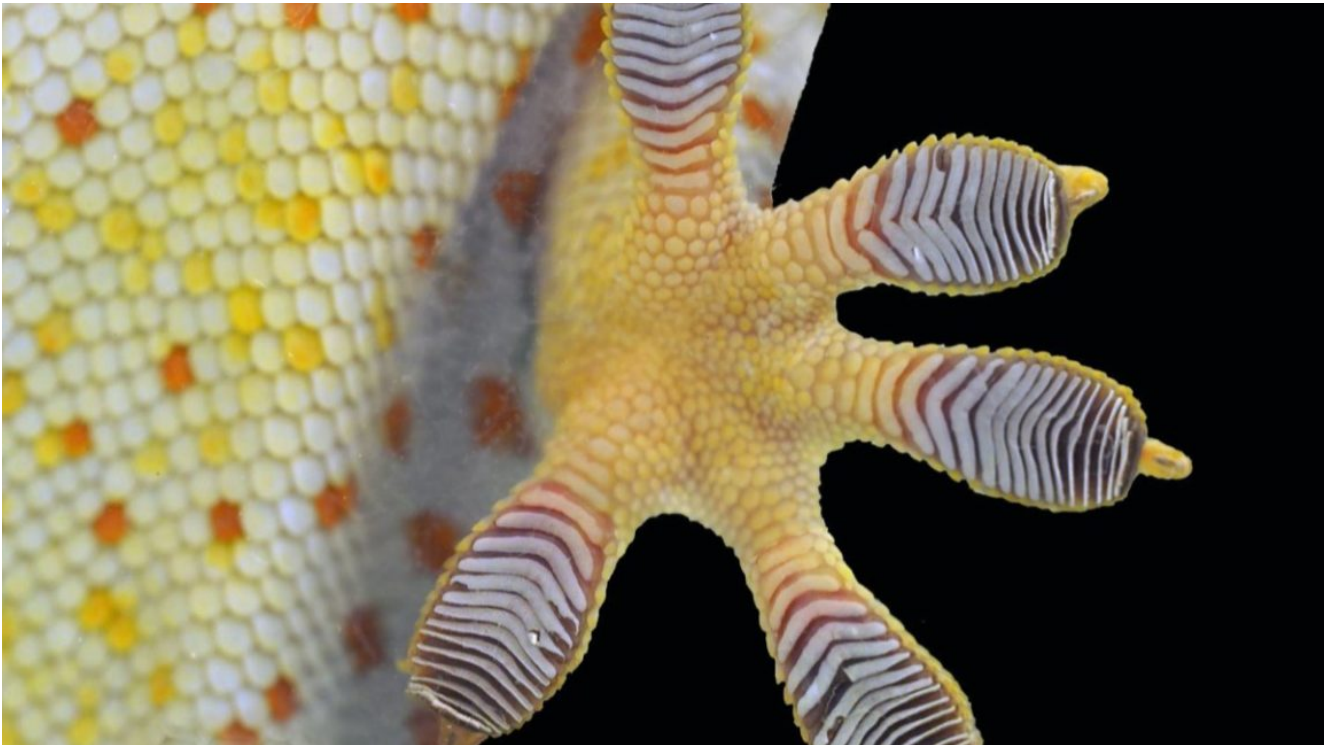


Gecko feet inspire anti-slip shoe soles



Gecko feet have inspired many intriguing applications, including a sticky tape, adhesives, a “stickybot” climbing robot, and even a strapless bra design. Now, scientists have developed a new kind of anti-slip polymer that sticks to ice, inspired by the humble gecko. Incorporating these polymers into shoe soles could reduce the number of human slip-and-fall injuries, according to a paper published in the journal ACS Applied Materials & Interfaces.

As previously reported, geckos are known for being expert climbers; they’re able to stick to any surface thanks to tiny hair-like structures on the bottoms of their feet. Those microscopic hairs are called setae, each of which splits off into hundreds of even smaller bristles called spatulae. It has long been known that at microscopic size scales, the so-called van der Waals forces—the attractive and repulsive forces between two dipole molecules—become significant.

Essentially, the tufts of tiny hairs on gecko feet get so

close to the contours in walls and ceilings that electrons from the gecko hair molecules and electrons from the wall molecules interact with each other and create an electromagnetic attraction. That's what enables geckos to climb smooth surfaces like glass effortlessly. Spiders, cockroaches, beetles, bats, tree frogs, and lizards all have varying-sized sticky footpads that use these same forces.

Geckos and their unusual feet have long been of great interest to scientists. In 2013, for instance, researchers designed a reusable dry adhesive inspired by the gecko's feet that easily stuck to smooth surfaces, adhering strongly when pushed forward and sliding off when pulled backward. In 2020, Berkeley scientists investigated why soft, hairy gecko toes only "stick" in one direction. And in 2022, scientists found that gecko feet are coated with an ultra-thin layer of lipid molecules in an upright orientation. This might serve to push away any water beneath the spatulae, allowing the spatulae to make closer contact with the surface, thereby helping the geckos maintain their grip on wet surfaces.

<https://arstechnica.com/science/2025/02/gecko-feet-inspire-anti-slip-shoe-soles/>