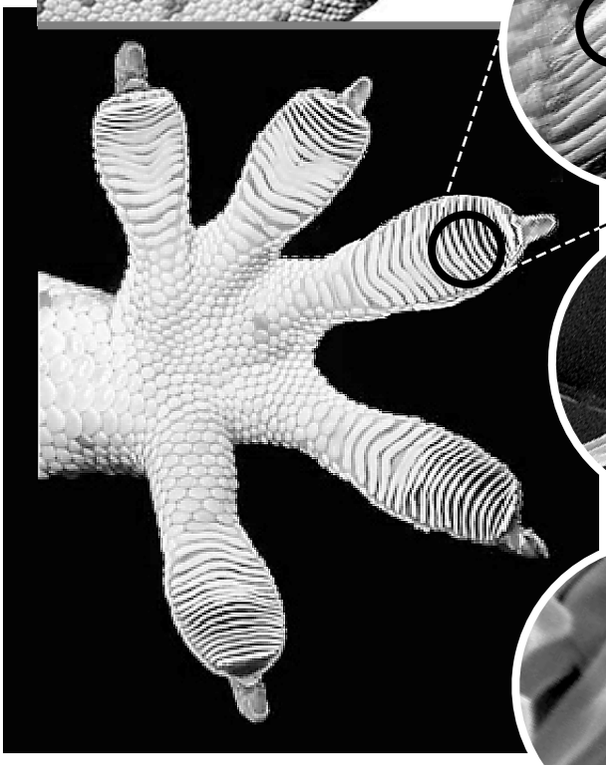
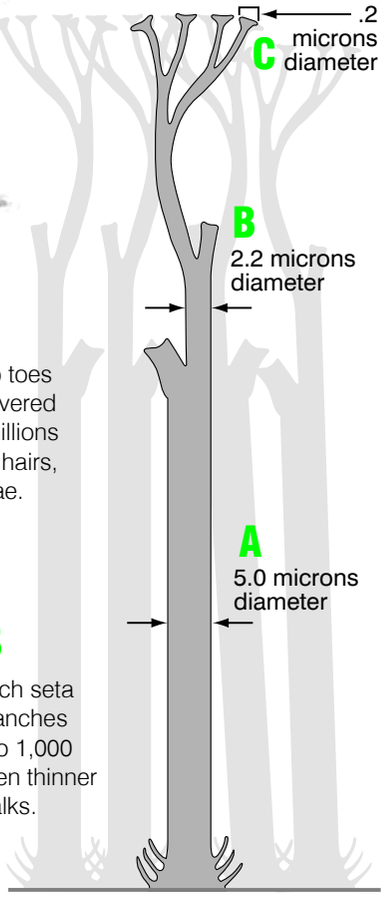
Making like a gecko

Scientists have unlocked the mystery of how geckos walk on walls and ceilings and have begun to produce synthetic versions of the tiny hairs that allow the little lizards to stick to almost anything.



Seta cross section



A
Gecko toes are covered with millions of tiny hairs, or setae.

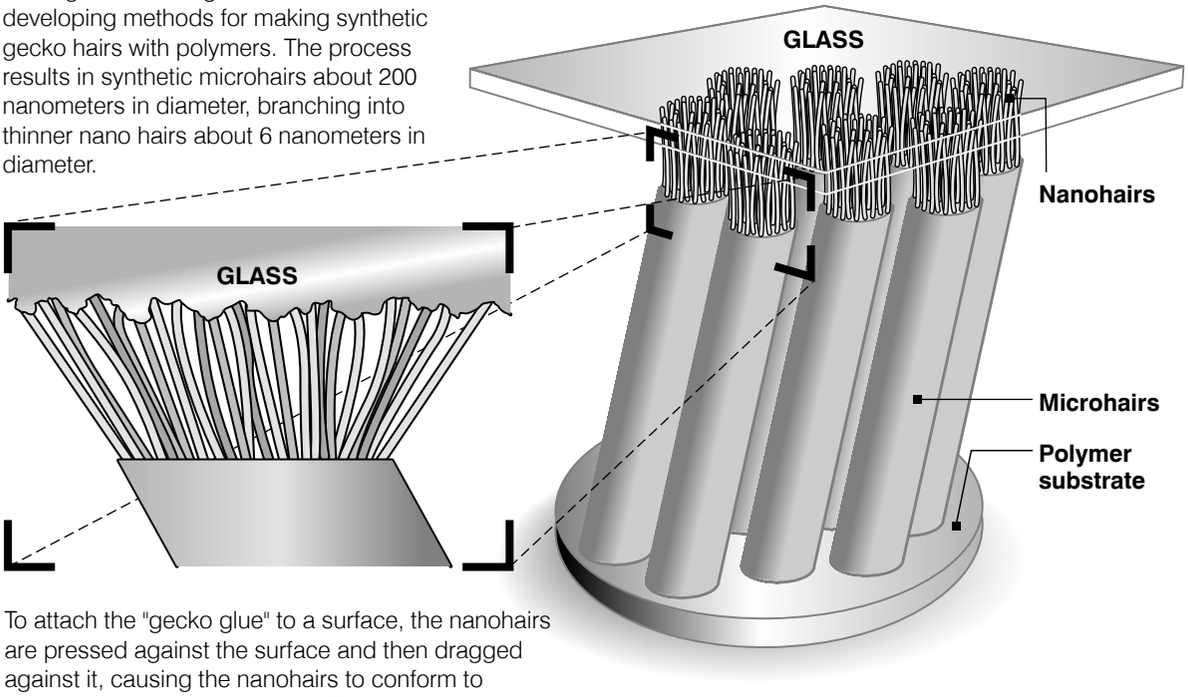
B
Each seta branches into 1,000 even thinner stalks.

C
Each stalk is tipped with tiny caps called spatulae.

By conforming to the shape of a surface, the setae get so close to the surface that weak attractive forces between molecules, called the van der Waals force, cause them to stick.

Man-made gecko hairs

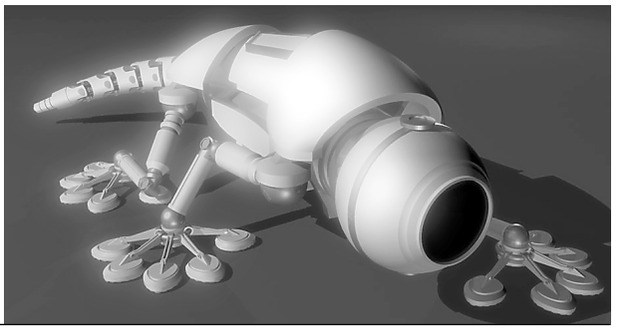
Carnegie Mellon engineer Metin Sitti is developing methods for making synthetic gecko hairs with polymers. The process results in synthetic microhairs about 200 nanometers in diameter, branching into thinner nano hairs about 6 nanometers in diameter.



To attach the "gecko glue" to a surface, the nanohairs are pressed against the surface and then dragged against it, causing the nanohairs to conform to variations in the surface shape. The hairs can be detached by pushing and twisting them in the opposite direction.

WaalBot ▶

In low-gravity conditions, such as in space and on some extraterrestrial planets, synthetic gecko hairs might allow legged robots to walk on spacecraft or scale rock walls.



Source: Metin Sitti

James Hilston/Post-Gazette