

Surfaces inspired by geckos can be switched between adhesive and non-adhesive states, study finds

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Credit: Mozul

Adhesives inspired by the gecko can be made to switch on and off reversibly and repeatedly. The key design parameters for these materials are identified in a study published in *Journal of the Royal Society Interface* today.

Geckos use thread-like fibres on their hands and feet to stick to surfaces. Synthetic gecko-inspired adhesives rely on the same fibrillar structures. In both cases nonchemical adhesion is created by concentrating the intermolecular forces between two bodies.

In 2007 researchers from the Leibniz Institute for New Materials, Germany created adhesive materials which could be switched on and off using differences in pressure. Now the same research group have shown precisely how to do this by adjusting the shape of the surface fibres.

Dr Paretkar and his team identified the key parameters that influence adhesion switchability; namely the fibrillar contact shape, radius, aspect ratio, orientation and the applied compressive load. They found that adding flap structures to the ends of the fibrils significantly enhanced how effectively adhesiveness could be switched on and off.

The synthetic adhesive materials are 'switched' on by pressing them against a surface and 'switched' off by increasing their pressure on the surface, which causes loss of adhesion.

The findings mean that new materials can be developed in which adhesiveness can be precisely controlled. This study was conducted using biocompatible material; if the same results can be repeated in biodegradable materials then they could be used during delicate medical procedures in which small objects have to be moved around. These adhesive materials could also be scaled-up and used as fillers in operations such as repairing a damaged ear drum without the use of stitches.

More information: Paretkar, D. et al. Preload responsive adhesion: effects of aspect ratio, tip shape, and alignment, *Journal of the Royal Society Interface*. dx.doi.org/10.1098/rsif.2013.0171

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