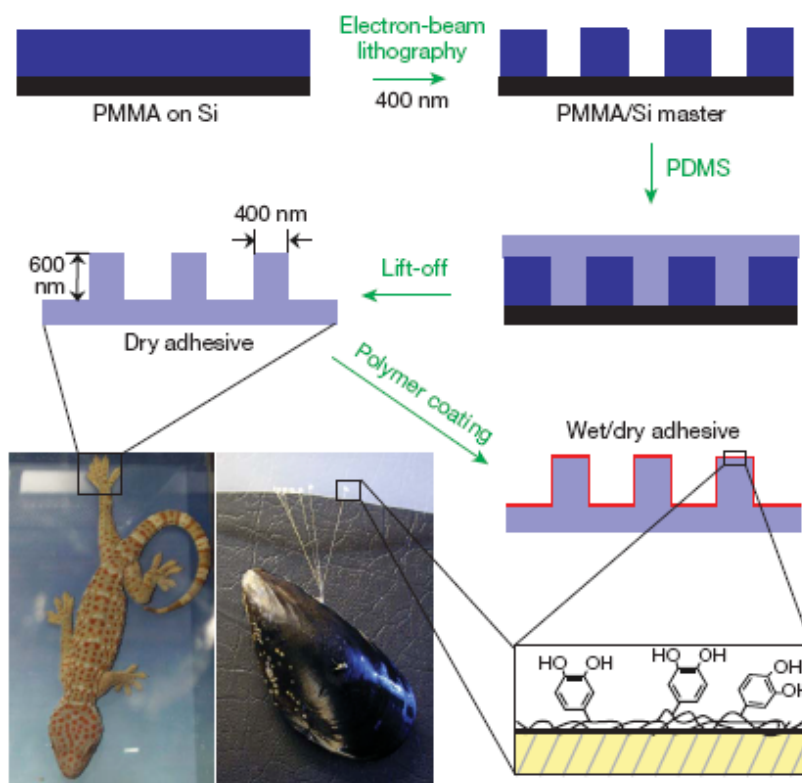


A Reversible Wet/Dry Adhesive Inspired by Mussels and Geckos

Natural adhesive materials provide a source of inspiration for derivation of biomimetic adhesives for a broad range of applications. However, natural adhesives have limitations, because they work only under specialized conditions representing a particular animal habitat. For example, adhesives found in sea animals such as mussel, are effective exclusively in wet environment, while adhesives of land animals such as gecko, possess superior dry adhesion, but do not function well on wet surfaces. There thus exists a great need for universal adhesives that can function equally well under wet and dry conditions. In their new work the scientists at Northwestern University in Chicago led by Professor Philip Messersmith merged wet-adhesive properties of mussel proteins with those of gecko foot pad adhesive composed of specialized nanoscale pillars. As a result, they created a hybrid adhesive, which they call geckel, consisting of gecko-mimetic pillars coated with mussel-mimetic polymer film. This strategy allowed the researchers to achieve an unprecedented success in creating an adhesive that maintains reversible adhesive properties over a thousand contact cycles in both dry and wet environment, which will be extremely valuable for dental, medical, industrial and military applications.



This cartoon shows the sequential steps involved in the fabrication of the multi-functional geckel biomimetic composite. The process involves first, producing a mold composed of nano-pillars made of gecko-inspired dry adhesive and then coating the mold with a thin layer of mussel-inspired wet adhesive.

Lee H, Lee BP, Messersmith PB. (2007) A reversible wet/dry adhesive inspired by mussels and geckos. *Nature*, 19, 448:338-341

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