

# It's the metal in the mussel that gives mussels their muscle power

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Researchers in California are reporting for the first time that metals are key ingredients that give the coatings of anchoring byssal threads of marine mussels their amazing durability. The study could lead to the design of next-generation coatings for medical and industrial applications, including surgical coatings that protect underlying tissues from abrasion and also life-threatening bacterial infections, the researchers say. Their study appears in ACS' *Langmuir*.

In the new study, Herbert Waite and colleagues point out that many existing coatings are severely limited by the materials they cover. A rubber band dipped in molten wax is a good case in point. Once hardened at room temperature, the wax is several times harder and stiffer than the underlying rubber, but even moderate extension shatters the wax. Scientists have been trying for years to develop robust coatings for soft or delicate underlying materials. Until recently, however, scientists knew little about the chemical mechanisms that allow mussels to coat the tendon-like fibers in byssal threads with a material that is both hard and extensible.

The researchers conducted a detailed chemical analysis of the protective outer [coating](#) of the byssus in a common species of marine mussel. They found that removing iron and calcium from the coating resulted in a 50 percent decrease in hardness, demonstrating that these metals play a key role in maintaining its integrity. Further insights could lead to the development of futuristic coatings with optimal strength and flexibility for medical and industrial applications, they note.

More information: *Langmuir*, “Metals and the Integrity of a Biological Coating: The Cuticle of Mussel Byssus”

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