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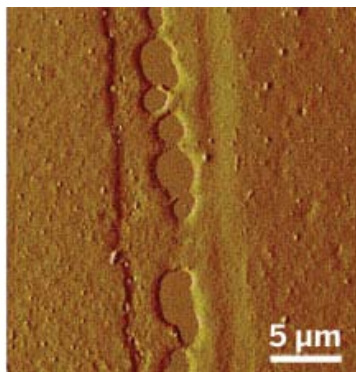
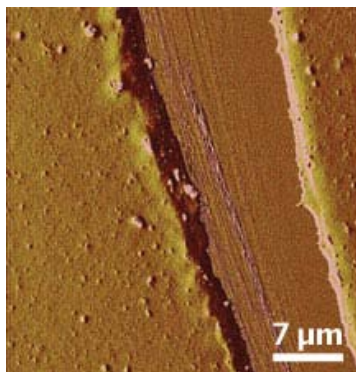
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Bacterial Sugars Battle Corrosion

ACS Meeting News: Environmentally friendly coatings made of polysaccharides protect metal from rusting

Sophie L. Rovner



Courtesy of Victoria Finkenstadt

NEARLY FIXED Atomic force microscopy shows that a scratch in a polysaccharide coating on a steel plate (left) has partially healed after being moistened with water for 30 seconds and then dried (right).

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Bacteria that grow on metal exposed to moisture often secrete proteins and carbohydrates that accelerate corrosion, but a few bacteria emit compounds that retard corrosion. Research chemist [Victoria L. Finkenstadt](#) and colleagues at [USDA's National Center for Agricultural Utilization Research](#), in Peoria, Ill., have now identified three strains of bacteria that produce these beneficial compounds and have also determined the compounds' structures.

The researchers showed that three *Leuconostoc mesenteroides* strains produce anticorrosion polysaccharides that can be collected from, say, a bioreactor, and then dispersed in water and sprayed on steel. This type of coating could be applied under paint to prevent metal equipment from rusting. Or it could be used as a substitute for the half-inch-thick wax coat currently used to protect steel rods during transit, Finkenstadt told C&EN. That wax must be removed before the rods are used and must be treated as toxic waste because it contains heavy metals, she said. The 50- to 500-nm-thick polysaccharide coating, on the other hand, could be left on the metal or chewed up by an enzyme to create harmless sugar water.

The coatings are self-healing, so a scratch fixes itself in about 15 seconds with the help of a squirt of water. The polysaccharides can even protect nearby uncoated metal, so even if a scratch can't heal completely, the exposed metal might still be safe. The researchers continue to assess the materials' durability and to determine whether the polysaccharides can stop corrosion that's already under way.

USDA is patenting the work so it can license the technology to companies interested in commercializing it.

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