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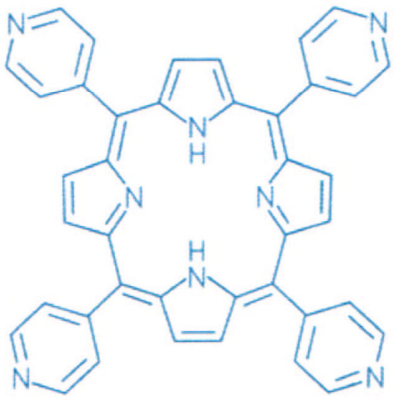
Molecules array when surface is just right

The structure of the layer formed on an unmodified gold electrode by a porphyrin derivative depends on the electrode potential, according to a study by assistant chemistry professor Eric Borguet and coworkers Yufan He and Tao Ye at the University of Pittsburgh. At positive potentials, the attraction between molecules and the surface is so strong that molecules stick as soon as they hit the surface, forming an unstructured layer. At negative potentials, the binding energy is so weak that molecules just slide over the surface without locking into ordered arrays. But at intermediate potentials, the binding energy allows just the right mobility for molecules to lie flat and form an ordered structure, which persists over a wide range of potentials [*J. Am. Chem. Soc.*, **124,** 11964 (2002)]. "It's like Goldilocks and the bowls of porridge," Borguet says. "When the surface potential is just right, self-assembly proceeds just fine." Growing ordered structures on a surface by electrochemical means is not new. But previous methods applied to similar porphyrin derivatives work only when the surface is permanently modified, Borguet notes. Electrodes coated with ordered porphyrin structures are of interest for nanotechnological applications, he adds.



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