

Abstract Submitted
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**An XPS and STM/STS Study
of Tetra(sulfonatophenyl)porphyrin Nanorods¹**

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Tetra(sulfonatophenyl)porphyrin, TSP, forms nanorods on Au(111) or HOPG.
These nanorods were examined by XPS, STM, and STS. N1s XPS data demon-
strate that the central four nitrogens of the porphyrin are completely protonated,
generating a positive central core and a negative molecular periphery that plays a
role in the rod formation process. STM studies in UHV also suggest the rods may
be collapsed tubes. STS results show that while single rods are somewhat rectifying
with primarily n-type conduction, bundles of rods show very strong rectification.
This difference in bundle versus single rod conduction may be an artifact of the
measurement method, with the single rod I-V curves containing both conduction
and tunneling currents while thicker bundle data is dominated by direct conduction.
Comparison of the STS of the nanorods with that of NiTPP molecules suggests that
the lowest unoccupied molecular orbitals are those that participate in the conduc-
tion process. It is also interesting to note that the STS of the nanorods on gold is
exactly the same as on HOPG, indicating that these rods have an effective Fermi
energy that equilibrates with the substrate.

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