

TOWARDS UNDERSTANDING AND CONTROL OF ULTRATHIN ORDERED FILMS OF PHTHALOCYANINES AND PORPHYRINES

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Two-dimensionally ordered ultrathin films (mostly monolayers) of various porphyrin and phthalocyanine derivatives on crystalline metallic substrates have been prepared by OMBE. Besides understanding of the self-assembled adsorbate structures observed using STM, also the electronic structure of the films has been studied by STS and PES. Controlled chemical modifications can be performed locally using the STM tip as well as globally using suitable thermal treatment.

Specific examples to be discussed here are:

- Adsorption of metal-free tetra(p-hydroxyphenyl)porphyrin (H₂THPP) on Au(111), Ag (111) and Ag(110) [1];
- STM tip-induced reversible deprotonation of single H₂THPP molecules on Au (111) [2,3];
- Adsorption and heat-induced surface-polymerization of Cu-octobromotetra-phenylporphyrin (CuTTPBr₈) on Au(111) [4];
- Self-metalation of metal-free phthalocyanine (H₂Pc) on Ag(110) [5];
- Charge transfer in PtPc-CoPc dimer layers.

An outlook will be given concerning future developments and applications.

Keywords: Ultrathin Organic Films; Adsorbate Structure; Surface Electronic Structure; Porphyrine Derivatives (H₂THPP, CuTTPBr₈); Phthalocyanine (H₂Pc); Organic Molecular Beam Epitaxy (OMBE); Scanning Tunneling Microscopy (STM); Scanning Tunneling Spectroscopy (STS); Photoelectron Spectroscopy (PES); Surface Chemical Reaction; Polymerization; Self-Metalation.

References

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