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Self-assembly of non-metallated tetraphenyl porphyrin molecules on noble metal substrates GEOFFREY ROJAS, XUMIN CHEN, JIE XIAO, PETER DOWBEN, YI GAO, XIAO CHENG ZENG, AXEL ENDERS, University of Nebraska-Lincoln, ENDERS TEAM, DOWBEN COLLABORATION, ZENG COLLABORATION — Studies of non-metallated meso-tetraphenyl porphyrin (TPP) molecules adsorbed on noble metal substrates of Cu(111) and Ag(111) will be presented. STM observations have been modeled using density functional theory (GGA-DFT). The STM results are consistent with the electronic structure obtained from combined photoelectron and inverse photoemission spectroscopy that confirm substrate dependent surface interactions with H2TPP. Self-organization of H2TPP into ordered 2D networks as a result of inter-molecular bonds is found only on Ag(111), as the molecule-substrate interaction allows for molecule diffusion. It was found that those TPP adsorbed on Cu(111) interacted strongly with the substrate, resulting in charge transfer and repulsive interaction between adsorbed molecules and no ordering on the surface. Rather, on Cu(111), the molecule-substrate interaction is much larger than the weaker inter-molecule binding energies. For Ag(111) the strongest interactions between the adsorbed molecules and the substrate appear to occur at substrate step edges.

Geoffrey Rojas
University of Nebraska-Lincoln

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