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Self-assembled monolayer films of Iron phthalocyanines on thin alumina films: characterization and properties

Electronic and reactivity properties of Iron phthalocyanines have been investigated using Density Functional Theory and scanning tunneling microscopy. Phthalocyanines (Pcs) are organic molecules possessing a central cavity which can accommodate a single metal atom (M). Metal phthalocyanines (MPcs) are able to adsorb on a variety of supports, with ordered structures determined by molecule-molecule and molecule-substrate interactions. Employing metal phthalocyanine self-assembling properties, it is possible to obtain model systems for biomimetic 1-D active centers, where unexpected properties may stem from the utmost low dimensionality. In our work we focus on Iron phthalocyanines deposited on ultrathin alumina films. These molecules self-assemble in highly ordered structures, stable enough to provide optimal candidates for model single atom catalysis. We found that it is possible to control the FePc's self-assembly decorating the alumina layer with Cu nanoclusters, switching between adsorbed structures governed by or molecule-molecule or molecule-substrate interaction.

Figures

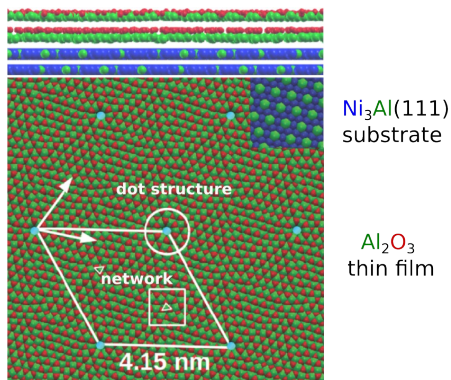


Figure 1: (Structural model of Al₂O₃/Ni₃Al(111))

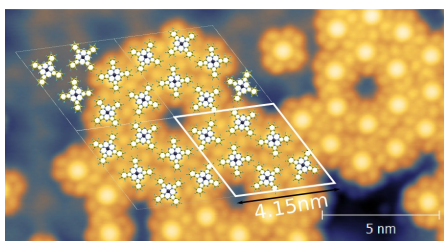


Figure 2: (STM image of FePcs on Al₂O₃/Ni₃Al(111), together with DFT model)

