Electronic and Vibronic states of CoTPP molecules deposited on Cu3N/Cu(110) surface Ricardo Facciol, Vinícius Claudio Zoldan2,3, Chunlei Gao2, André Avelino Pasa2 1 - Cryssmat-Lab and Centro NanoMat, Facultad de Química, Universidad de la República, Montevideo, Uruguay. 2 - Max Planck Institute of Microstructure Physics, Halle, Germany 3 - Laboratório de Filmes Finos e Superfícies, Universidade Federal de Santa Catarina, Brazil

For applications such as molecular electronics and spintronics, it is very important to accurately describe the interface between molecular species and the underlying surfaces. In this work, we have used low temperature scanning tunneling microscopy to study the physical and chemical interaction between individual cobalt-tetraphenylporphyrin molecules and a copper nitride thin film. We have demonstrated that the Cu3N-Cu(110) system promotes a selective decoupling of the porphyrin macrocycle from the local environment, allowing visualization of the molecular orbitals and vibronic states of the molecule[1], while maintaining a strong coupling between the Co-dz2 orbital and the substrate. The reverse behavior was observed for adsorption of the same molecule onto a metallic Cu(110) surface. First principles calculations confirm both the molecular adsorption site and the electronic decoupling of the molecular states from the substrate.

[1] P. Donovan, A. Robin, M. S. Dyer, M. Persson, R. Raval, Chem. Eur. J. 16, 11641 (2010).