A Molecularly Resolved Study of Palladium Coordination to a Self-Assembled Monolayer (SAM)

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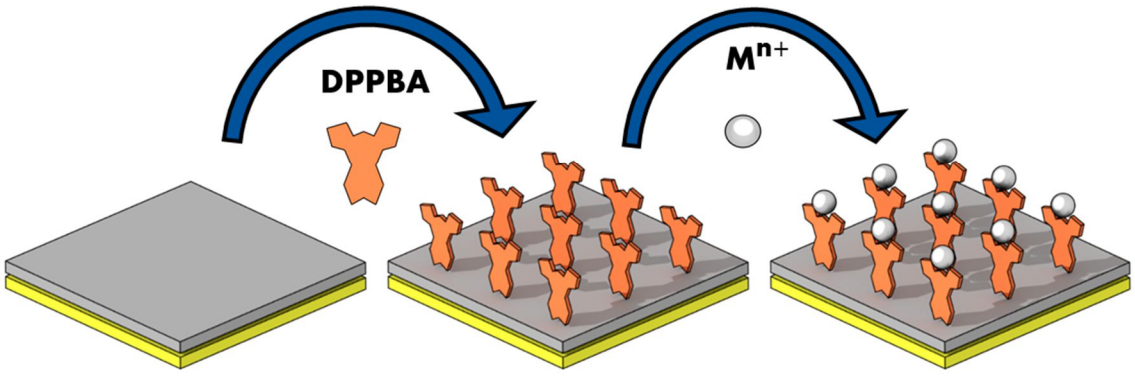
Metal-organic coordination in SAMs is of interest in areas as different as surface based metal organic frameworks [1] and spintronics [2] [3] but its exploitation will depend on the level of control of coordination chemistry at surfaces. As part of our efforts to unravel the factors controlling metal-organic coordination on surfaces, palladium complexation with 4-(2,6-di(pyrazol-1-yl)pyridine-4-yl)benzoic acid (DPPBA) was studied. DPPA was coadsorbed with 1-adamantanecarboxylic acid (AdCOOH) on an Au/mica substrate modified by an underpotential deposited Ag bilayer. Both molecules bind to the substrate through the carboxylic acid group creating the mixed layer that will allow for the conformational degree of freedom of the DPPBA required to coordinate Pd from the $[Pd(MeCN)_4](BF4)_2$ complex.

Scanning tunnelling microscopy (STM), X-ray photoelectron spectroscopy (XPS) and near edge X-ray absorption fine structure (NEXAFS) spectroscopy were used to characterise the mixed layers before and after exposure to Pd. Characteristic height changes in the STM images reflect the coordination of Pd, in agreement with the spectroscopic signatures seen in the XPS and NEXAFS spectra.



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