ESRF	**Experiment title:** Investigation of the anisotropic properties of regular array of nanostructured metal phthalocyaninato (MPcx) systems.	**Experiment number**: HC 674
Beamline: ID08	**Date of experiment**: from: 9th April 2013 to: 23rd April 2013	**Date of report**:
Shifts: 18	**Local contact**: Kurt Kummer	*Received at ESRF:*

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Report:

During our allocated beam time, we studied both the electronic and magnetic properties of Iron phthalocyanine ($Fe^{II}Pc$) deposited *in situ* as thin films (from sub-monolayer to multilayers) via thermal evaporation in ultra-high vacuum. The investigation of the molecules was carried out using XAS with circular and linear polarized light and extracting the XMCD and XNLD contributions as a function of the orientation of the sample. By utilizing the unique capabilities of the ID08 beam line it has been possible to track the variance of the respective edges when the molecules were evaporated on different surfaces and at different thicknesses.

Sub-monolayer coverages of the FePc molecules were prepared on clean Cu(100), Cu(100) with copper nitride (Cu_2N) islands, and on a Cu_2N monolayer on Cu(100). The 'Variable Temperature' STM system, provided at ID08, was utilized to characterize the level of coverage both of Cu_2N on the Cu(100) surface of molecules adsorbed on these samples before XMCD and XNLD characterization were carried out. The STM was also used to ensure that the surface on which the molecules were evaporated were clean and as expected. This was particularly important in regards to Cu_2N preparations because the parameters needed for achieving a specific coverage can often be difficult to control. STM images taken on the beam line of the prepared surfaces are shown in Fig 1.

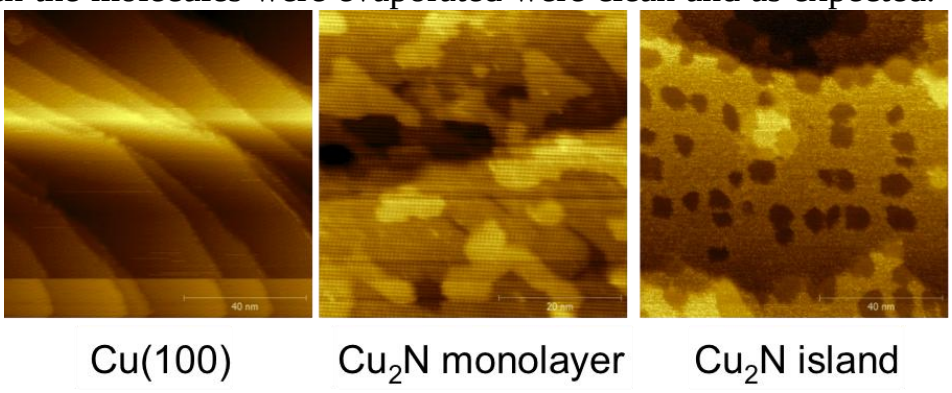

Figure 1: STM image of the Cu(100), Cu2N monolayer and Cu2N islands; taken with the VT STM on the ID08 beamline

Initial experiments included the measurement of bulk FePc compounds and a sub-monolayer coverage on Cu(100) in order to provide a reference. Figure 2 shows an XAS and XMCD spectra for an sub-monolayer coverage of FePc on Cu(100). It can be seen that it corresponds well with data taken on thin films and monolayers [Bartolomé *et al*. PRB, *81*(19), (2010); Stepanow *et al.* PRB *83*(22), 220401 (2011)]. We checked carefully that the FePc sub-monolayer did not undergo any radiation damage during XMCD data collection thanks to an appropriate experimental set-up.

The next set of experiments involved the preparation of a Cu_2N thin insulator on the Cu(001) surface to act as a decoupling layer from the metallic substrate. Here we observed a variance in both XMCD and XNLD to the sub-monolayer coverage on clean copper. We also prepared thicker films on both copper and Cu_2N substrates to verify that the observed changes were due to the surface. Additionally results were taken with FePc molecules sitting at the edges of the copper nitride islands.

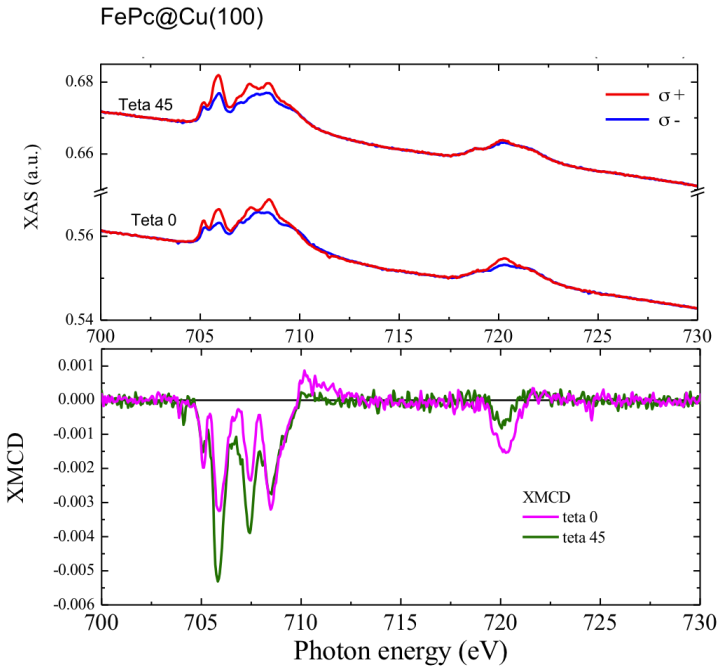

Figure 2: XAS and XMCD data on a sub-monolayer coverage of FePc on Cu(100).

The observed change in XMCD behavior and XNLD with the changes in surface from Cu(100) to Cu_2N is not yet fully understood. We hope that combining these experiments with complementary STM results and theoretical calculations will yield fruitful results; at this time we will update this experimental report.