 ESRF	Experiment title: Structural determination of an ordered C60 monolayer on Pt(111)	Experiment number: SI 357
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Report

We are interested in the interface geometry of C60 interacting with different substrates (Au, Pt, Ni and Si), in order to clarify the kind of Carbon-substrate interaction and the condition of the bond that leads to fragmentation.

The Pt substrate is reactive to absorbed molecules and Pt(111) is the metal surface with the highest work function. Fullerene interaction with Pt(111) substrate induce a strong covalent bond that is substantially different to the C60-Au bond where the ionic character dominates.

The aim of our experiment, performed at the ID32, is the structural determination of the C60/Pt(111) QH2 reconstruction, the possible reorganization of the close-packed Pt(111) substrate in order to enlight how the C60 fragmentation process is catalysed by the substrate. To better understand the nature of the interaction of the first fullerene monolayer with the Pt substrate we measured non integer order reflections as a function of vertical exchanged momentum “1” corresponding to the QH2 reconstruction and of some CTRs. We havo to have a set of data large enough to fully determine the structure of the absorbed monolayer of C60 the geometry which is formed with the substrate and the induced substrate atomic displacements.

The sample preparation was performed using the same procedure defined in our laboratory and lead to the appearance of sharp diffraction peaks belonging to an ordered QH2 reconstruction. This reconstruction is present also for coverages exciding 1 ML and a sample 10 ML thick was also obtained.

In figure 1 we show an h scan of the QH2 reconstruction. Several peaks are clearly visible. From the peak widths we can state that the domain size was of the order of 200 Å.

From the analysis of the measured intensities we hope to fully determine the strucure. This system seems to be very different to the similar CGO/Au(110) where a strong subsurface reconstruction of the gold was unexpectedly found. In this case, from a preliminary analysis of the data, the Pt (111) surface seems to simply show a small vertical relaxation without the appearance of any complicated reconstruction.

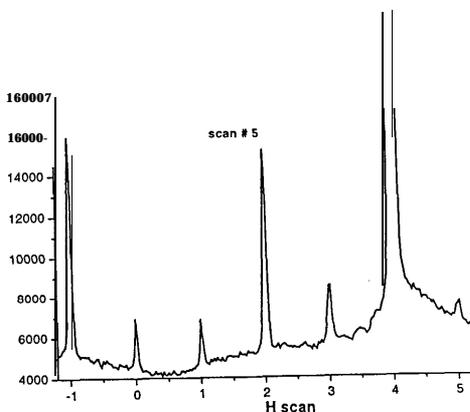


Fig. 1) H-scan of the QH2 C60-Pt(111) reconstruction. Several peaks corresponding to this reconstruction are clearly visible. The peak at H=4 is a CTR and it is about 2 order of magnitude more intense than the other peaks.