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| | **Experiment title: Structure of epitaxial silicene on diboride thin films** | **Experiment number**: MA-2480 |
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**Report:**

Thiol monolayers on noble metal surfaces are of tremendous scientific interest and have been used in thousands of publications. They have a wide variety of possible applications[1] like the production of conducting nanometre thin sheets[2] or biosensors[3]. Gold is usually evaporated onto silicon wafers or on muscovite mica to produce a flat interface for the thiol monolayer. Mica is arguably one of the most convenient substrates around, because cleaving the crystal leads to a flat and clean surface[4] that has been used in many studies, e.g. single DNA strands and the gold-thiol system mentioned above.

Several thiol monolayers were prepared at the Radboud University, inspected using atomic force microscopy, and brought to the ESRF for surface X-ray diffraction measurements. Seven different thiols were used to prepare monolayers on $K^+$- and $Cu^{2+}$-terminated muscovite mica. A full dataset of several crystal truncation rods of muscovite mica was measured for all fourteen samples, and also for a $Cu^{2+}$-terminated muscovite mica reference sample. We have looked for in-plane diffraction peaks for all these surfaces, to find out if the thiol layers exhibited in-plane order. No fractional order diffraction peaks were found. The data has been fully processed (see figure), but a feasible model that fits the data has not yet been found for every dataset.

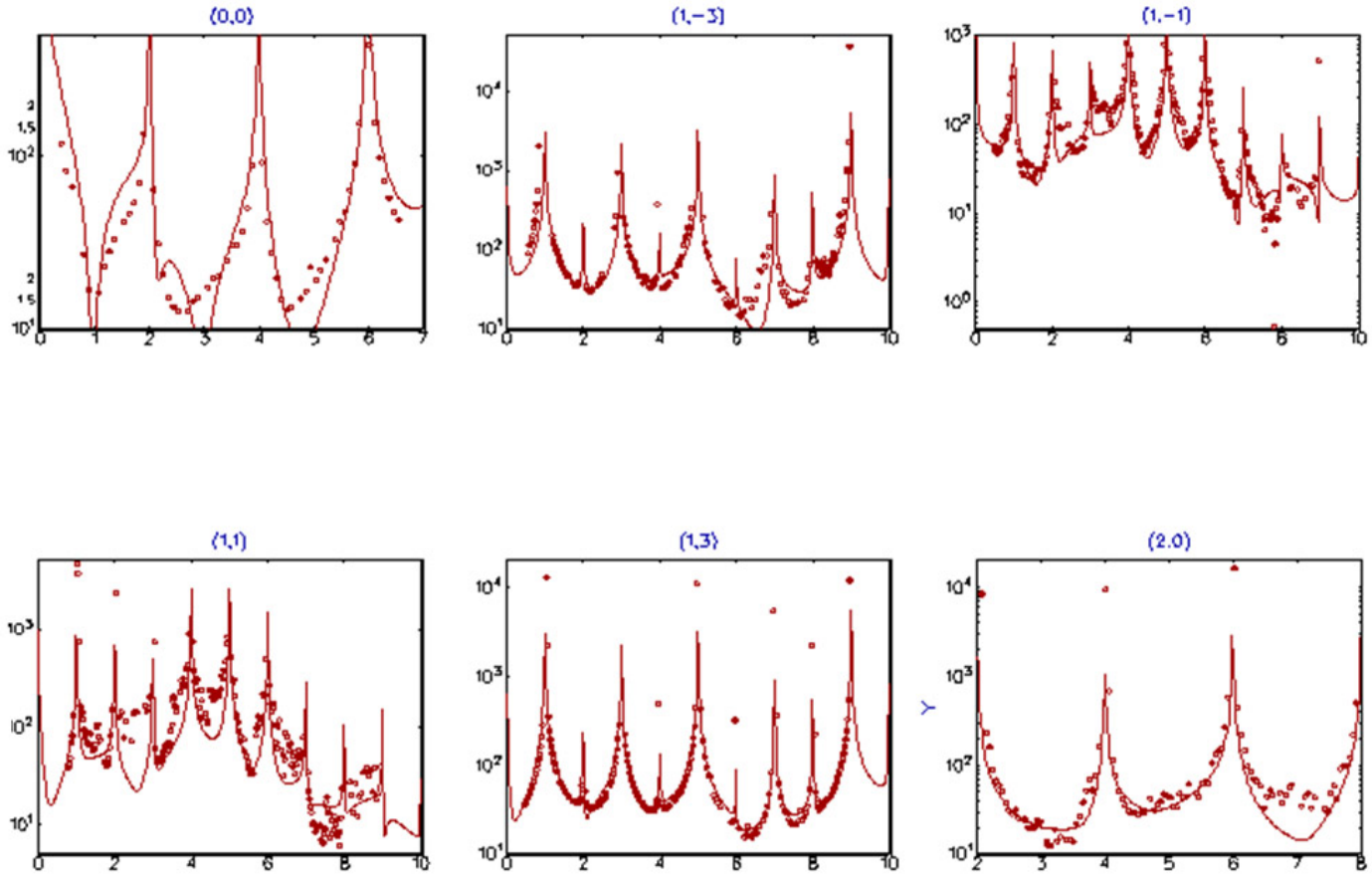


*Figure 1 Data of a biphenylthiol monolayer (dots) with a preliminary fit (line) with one biphenylthiol molecule and the muscovite mica surface to fit the data. The vertical axis depicts the measured structure factor, the horizontal axis shows the l-value, indicated on top are the (h, k) of the measured CTR.*

In conclusion, this was a very successful experiment in which several good data sets for 15 different systems, containing thiol monolayers on $K^+$- and $Cu^{2+}$-terminated muscovite mica, have been obtained. Data analysis is in progress and will take time due to the large number of systems investigated.


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