Surface tendencies: Structures and Strategies

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The interests of Surface Science Community are expanding towards new objectives as nanostructured materials, self assembly systems, molecular positioning and configuration and synthesis of 3-dimensional nano-objects, among others. The process of self-assembly of large functional molecules on surfaces is of special interest due to its implication to creating thin films of complex organic molecules for different purposes. The analytical tools as well as the experimental requirements to accurately determine the structure of these new types of materials are different of those used in a classical way. Classical analytical tools, successfully applied in Surface Crystallography, show their limitations to understand the surface structure in cases where the number of active atoms participating in the reconstruction is too large. By the other side, surface structures involving large unit cell parameters need for large data sets, not only to apply new analytical tools as "phase retrieval methods" but also during the refinement procedure of the surface structure using least-square minimization procedures. A reasonable number of experimental points by parameter is needed to reduce the uncertainty in the structure determination. For this reason the classical "rocking curves" data acquisition strategy, which is highly synchrotron time consuming, should be complemented with faster data collection strategies.

Two surfaces structures will be used as examples to illustrate these arguments: C60/Ge(111)-(√13x√13)R14º and the Calixarene/Au(110)-p(19x6), measured both at the ESRF: beamlines ID32 and BM32, respectively and in collaboration with their respective Scientific Groups