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High resolution X-ray diffraction and surface/interface scattering beamline NANO at ANKA

NANO at ANKA is a synchrotron beamline – currently in hot commissioning phase – on a superconducting undulator source, specialized on high-resolution x-ray diffraction, surface and interface X-ray scattering investigations. Its optic has been optimised to deliver a monochromatic and highly collimated beam with sufficient flux to investigate the structure changes and the strain evolution during the growth of epitaxial films and superlattices. In order to carry out a real time measurement, different types of environmental chambers, like e.g. a molecular beam epitaxy chamber, will be mounted on a heavy duty diffractometer which could support up to 500 kg and rotate the sample and its environmental in all directions in space. With two different detection systems, both part of the diffractometer, the possibility to perform simultaneously two measurements will be available: Grazing Incidence Small Angle X-ray Scattering (GISAXS) to determine the shape, size, position and correlation in nanostructures and Grazing Incidence Diffraction (GID) to characterise the surface-patterned structure. One of the main issues of the beamline is to study the interface properties like roughness and correlation even for less scattered materials like organic semi-conductor. For that reason, there is the possibility to use a double multilayer monochromator to get two orders of magnitude of flux more with an energy resolution of 1%. One of our main interests is the real time monitoring e.g. of the growth of nano-particles and nanostructures. The beamline NANO has been designed with a very attractive flexibility to perform real space resolved experiments using a beam of 30 µm x 200µm size – or even smaller in the future.

Fig. 1: First white beam light at the fluorescent screen 4 closest to the experiment deflected by all four mirrors.

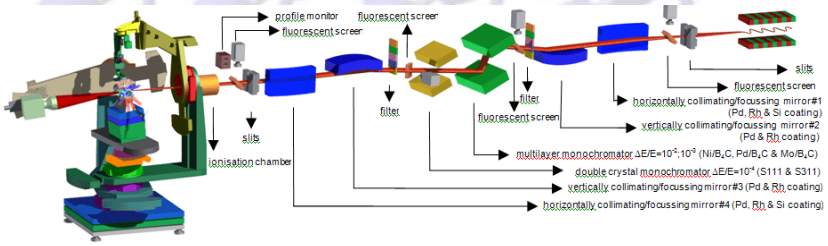

Fig. 2: Beamline layout of the NANO beamline dedicated for high resolution X-ray scattering and surface and interface scattering.

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