ESRF	**Experiment title:** **Coherent X-ray Diffraction Imaging of Single InSb/InP and InSb/InAs Nanowires**	**Experiment number**: HS3904
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Abstract:

We carried out a Coherent X-ray Diffraction Imaging (CDI) experiments on single nanowires. The aim was to collect the 3D diffraction patterns from heterogeneous nanowires to image strain field and chemical composition.

Experimental set-up:

The new ID01 monochromator was used in order to achieve less vibrations, a smaller focus spot size and an higher coherence. Energy was fixed at 8 keV and a Fresnel Zone Plate (FZP) was used to focus the beam down to a 300x500 nm² spot size. Slits in front of FZP were closed down to 80x30 μm² to select the coherent part of the beam. All data were collected using a MAXIPIX camera to ensure the best resolution and the lowest background.

Preliminary results:

One of the principal difficulties that we had during measurements was the limitations of the mechanical precision for the translation motors. This yielded to the impossibility of collecting 3D diffraction patterns during the experiment.

The detector was placed at the Bragg angle of a chosen crystalline reflection and the sample were scanned with the X-ray in order to find the wire with the right orientation.

The method was applied to two different type of nanowires.

1. InSb/InP nanowires:

InP nanowires with an InSb segment at the top were taken on the original substrate (InP) in order to measure the scattering of the InSb part taking the advantage of the large difference in the lattice parameters.

It was also possible following on the same nanowire the InP and the InSb parts following the growth direction and the 2D diffractions were collected during the experiment, as shown in Figure 1. For this measurement wires were scratched down on the substrate.

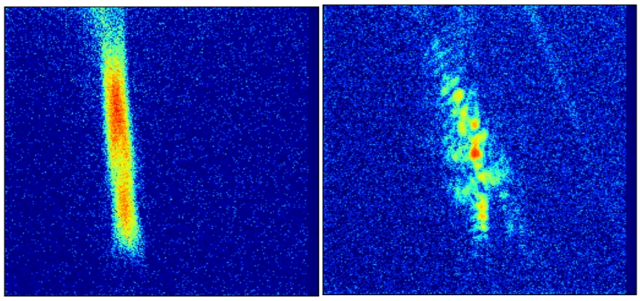

Fig 1: 2D coherent diffraction images of a single InSb/InP nanowire . Scattering from (111) reflection was collected for the InSb (right) and the InP (left) part for the same nanowire.

2. InSb/InAs nanowires:

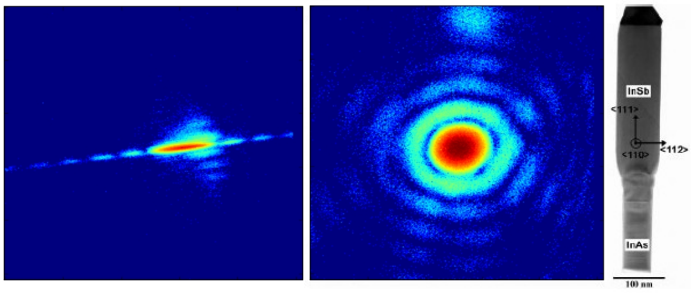

Figure 2: Diffration patterns from (220) reflection for InAs (left) and InSb (middle) part of single InSb/InAs nanowires (right).

InAs nanowires with a InSb were removed from the substrate and the 2D coherent diffraction imageswere collected for different reflections, either for InSb and InAs segments. Scattering from (220) reflection for InSb and InAs is showed in Figure 2.

Analysis for data collected during the experiment is in progress.

This work is part of Francesca Mastropietro's PhD thesis in a collaboration between ESRF ID01 and CEA Grenoble.