



## Experiment Report Form

**Experiment title:**

GISAXS and CDI of individual Ga-droplets and GaAs nanowires

**Experiment****number:****HC-3209**

<b>Beamline:</b>	<b>Date of experiment:</b> from: 22.02.2018 to: 28.02.2018	<b>Date of report:</b> 27.06.2018
<b>Shifts:</b>	<b>Local contact(s):</b> Manfred Burghammer	<i>Received at ESRF:</i>

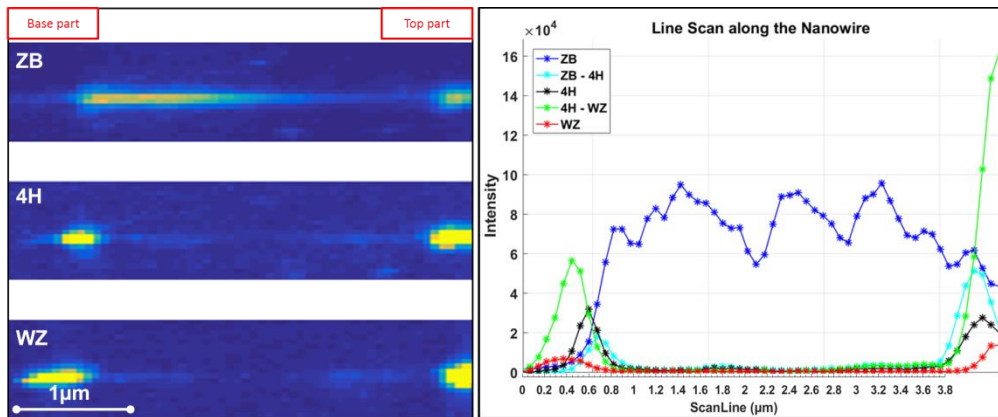
**Names and affiliations of applicants** (\* indicates experimentalists):

Arman Davtyan<sup>1\*</sup>  
 Danial Bahrami<sup>1\*</sup>  
 Prof. Ullrich Pietsch<sup>1</sup>  
 Prof. Tilo Baumbach<sup>2</sup>  
 Philipp Schroth<sup>1,2\*</sup>  
 Ludwig Feigl<sup>2\*</sup>  
 Julian Jakob<sup>2\*</sup>

1) University of Siegen  
 2) Karlsruhe Institute of Technology

## Report:

Nano X-ray diffraction experiments in combination with nano fluorescence have been performed to extract the crystalline phase structure along individual GaAs NW and GaAs/InGaAs core-shell NW. This experiment was realized recently (Feb 2018) at ID13 beamline of ESRF using beam energy of 14.8KeV and a focused nano-beam of size 200nm x 200nm (vertical and horizontal). Here we measured X-ray diffraction and fluorescence from Gallium originating from the same GaAs NW, correlating both spatial and crystalline properties. After identifying the NW of interest and fulfilling the Bragg condition for GaAs (333) reflection, up to three separated peaks could be observed belonging to three different structural phases of GaAs (ZB, 4H and WZ) appearing at slightly different Bragg angles. Setting the incoming X-ray beam angle to one of these phase selective Bragg angle and scanning along the NW growth axis we could spatially resolve the axial crystal phase structure of the NW. Although detailed data analysis is ongoing our preliminary results show that the base part of NW is mainly composed by WZ phase structure followed by 4H structure along the growth axis (see figure below). After certain length measured from the substrate, ZB becomes the main phase structure towards the top part of NW. Comparing different single NWs it turns out that the phase composition of each NW is different.



**Fig1:**  
**left – spatially resolved x-y intensity maps of a GaAs NW.**  
**right – intensity profile of GaAs (ZB, WZ and 4H) (333) Bragg reflection along the NW axis (from bottom to top)**