

09: Characterization of nanostructures by Transmission Electron Microscopy

JEAN-LUC ROUVIERE · Hanako OKUNO

INAC / SP2M / LEMMA, Minatec, UGA - CEA Grenoble

The aim of this practical work is to characterize nanostructures using Transmission Electron microscopy (TEM). High resolution images, diffraction and chemical analysis with a nanometer resolution will be performed.

Observed Nanostructures, will 2D-layers or III-V nanowires or nanoparticles or 2D layers. Eventually, students could bring a sample to be studied, but this should be discussed by email before the practical.

The practical is opened to a maximum of 5 students having a diploma in chemistry, physics or material science, but it is not necessary to have previous knowledge of electron microscopy.. Students will either discover the technique or improve their knowledge by asking questions and operating modern equipments. Two microscopes of the Minatec nanocaracterization platform will be used in turns by the two formed groups of 2 or 3 students.

GROUP 1 : Scanning transmission electron microscopy (STEM) will be demonstrated on a FEI TITAN THEMIS microscope fitted with a probe Cs-corrector and 4 EDX (Energy Dispersive X-ray) detectors. High Resolution images and Chemical composition and electron diffraction will be realised by EDX (Energy Dispersive X-ray) spectroscopy using the 4 detectors of the microscope.

GROUP 2 : High resolution (HR-TEM) and diffraction will be done on a FEI microscope equipped with an image corrector.

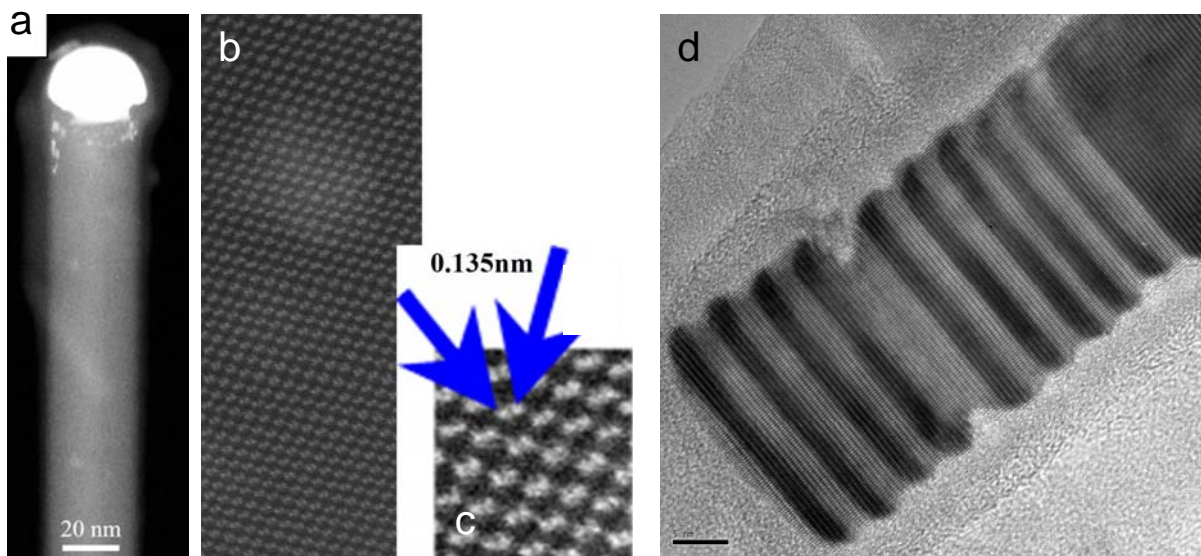


Figure a) Low resolution STEM images of a Si nanowire. Small clusters are detected at the top of the NW near the gold catalyst. b-c) HR-STEM image of the edge of a NW . Silicon dumbbells distant of 0.135nm can be seen. d) GaN(dark)/AlN(bright) heterostructure in a NW from HRTEM