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IT-11-P-3505 Electron holography for magnetic and electric in situ imaging

Ponce A.[1], Cantu-Valle J.[1], Diaz Barriga E.[2], Luna C.[2], Mendoza-Santoyo F.[1], Jose Yacaman M.[1], Eder J.[1]

[1]University of Texas at San Antonio, [2]Universidad Autónoma de Nuevo León

Email of the presenting author: arturo.ponce@utsa.edu

In this work we report the local magnetic behavior of multi-segmented Cox-Ni1-x nanowires by off-axis electron holography as well as electric contribution in ZnO nanostructures. The nanowires were grown by electrode deposition, by alternating cycles that produce the multi-segmented structure. The crystalline phase of each segment and magneto-crystalline anisotropy will be resolved by the phase maps obtained by electron holography.
Samples were studied using JEOL JEM ARM-200F. Holograms were obtained under two different conditions; first following the dual-lens imaging system, using a voltage in the objective lens of 1V, and secondly under Lorentz mode, with the objective lens turned off.
The ZnO nanorods were studied under external bias applied to the sample in situ TEM. The experimental setup consists in a connection from the holder (Nanofactory electrical holder) to the external source. The holograms have been live recorded and the electric variation is observed in the reconstructed phase.
In order to select the optimum parameters for the holograms reconstruction, the fringe spacing, interference width and fringe contrast were measured for different biprism voltages. The holograms were recorded in-focus with a biprism voltage of about 20-23V and interference fringe spacing of 5nm and a fringe contrast of 22%. The quality of the holograms will depend in a high fringe contrast and number of electrons on the holograms, which imply better signal to noise ratio, this will be reflected in the reconstructed phase and amplitude images. The holograms acquisition was obtained using specialized software from Gatan, Digital Micrograph (DM) and processed by the latest version of HoloWorks, which includes a new feature to extract the magnetic induction and magnetic contours from a phase image.

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