Quantitative HAADF Analysis

Atomic-Column Compositional Analysis from HAADF-STEM images

qHAADF

DigitalMicrograph Plug-in

InAs 0.9 ML

InAs 1.4 ML
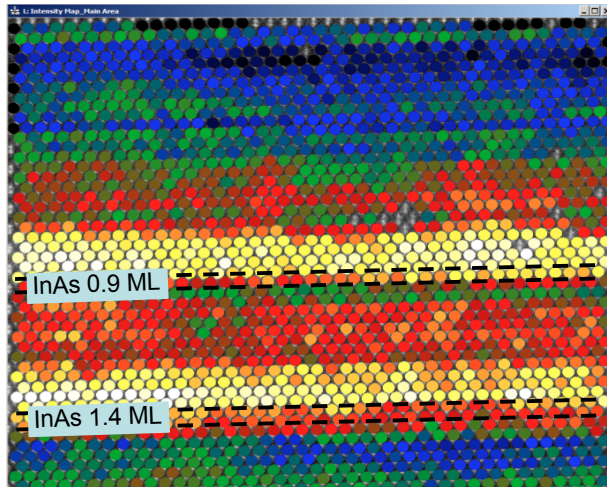
Map of normalized integrated intensities measured from a HAADF-STEM image of a double InAs-GaAs epitaxial layer. These intensities are directly related to the composition in each atomic column of the material.
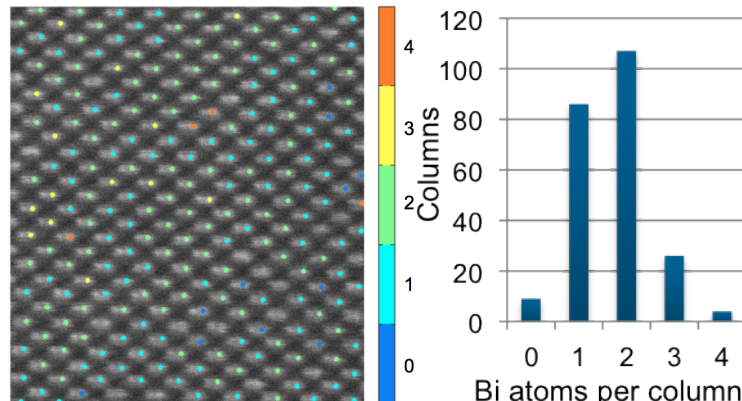
Map of Bi content (expressed as number of atoms) in each atomic column of a $GaAs_{1-x}Bi_x$ epitaxial layer, which has been obtained from the analysis of integrated intensities of HAADF images.

qHAADF performs column-to-column compositional analysis of materials from the integrated intensities of an atomic-column resolved HAADF-STEM image.

qHAADF is based on a method developed by Sergio I. Molina et al. of University of Cadiz [1].

Key Features

◆ Gives a map of integrated intensities and/or composition in materials with atomic-column spatial resolution.

◆ Experimental HAADF images are used to obtain the fitting parameters to determine composition.

◆ Automatic finding intensity peaks and noise filtering tools.

◆ Compositional segregation profiles can be obtained from epitaxial layers [2] (top figure).

◆ Counts atoms in each atomic column [3] (bottom figure).

◆ Locates interstitial atoms in materials.

References:

[1] S. I. Molina, D. L. Sales, P. L. Galindo et al., Ultramicroscopy 109 (2009) 172-176: Column-by-column compositional mapping by Z-contrast imaging (Erratum: 109 (2009) 1315).
[2] D. Hernández-Maldonado, M. Herrera, P. Alonso-González et al., Microsc. Microanal. 17(2011) 5780-5783: Compositional analysis with atomic column spatial resolution by 5th order aberration-corrected scanning transmission electron microscopy.
[3] D. L. Sales, E. Guerrero, J. F. Rodrigo et al., Appl. Phys. Lett. 98 (2011) 101902:1-3: Distribution of Bismuth Atoms in GaAsBi Epilayers.