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Interface characterization using atomic core-level shifts[1] ERIK HOLMSTROM, Universidad Austral de Chile, WEINE OLOVSSON, Kyoto University, IGOR ABRIKOSOV, Linkping University, ANDERS NIKLASSON, Los Alamos National Laboratory, M. GORGOI, BESSY, Berlin, Germany, OLOF KARIS, SVANTE SVENSSON, Uppsala University, F. SCHAFERS, W. BRAUN, BESSY, Berlin, Germany, G. OHRWALL, G. ANDERSSON, B. JOHANSSON, M. MARCELLINI, Uppsala University, W. EBERHARDT, BESSY, Berlin, Germany
— We propose a nondestructive technique based on atomic core-level shifts to characterize the interface quality of thin film nanomaterials. Our method uses the inherent sensitivity of the atomic core-level binding energies to their local surroundings in order to probe the layer-resolved binary alloy composition profiles at deeply embedded interfaces. From an analysis based upon high energy x-ray photoemission spectroscopy and density functional theory of a Ni/Cu fcc (100) model system, we demonstrate that this technique is a sensitive tool to characterize the sharpness of a buried interface. We performed controlled interface tuning by gradually approaching the diffusion temperature of the multilayer, which lead to intermixing. We show that core-level spectroscopy directly reflects the changes in the electronic structure of the buried interfaces, which ultimately determines the functionality of the nanosized material.

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