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X-ray standing wave photoemission from multilayer nanostructures[1] C. PAPP, B. BALKE, LBNL, C. SAKAI, S. UEDA, H. YOSHIKAWA, Y. YAMASHITA, S. L. HE, K. KOBAYASHI, SPring 8, G. CONTI, Applied Materials, D. BUERGLER, C. SCHNEIDER, Juelich Research Center, C. S. FADLEY, UC Davis/LBNL, S. DOERING, U. BERGES, C. WESTPHAL, TU Dortmund — We have used soft and hard x-ray standing wave excitation of photoelectrons to study buried layers and interfaces in multilayer nanostructures. The samples were grown on synthetic multilayer mirrors, and the x-ray incidence was tuned to 1^{st} order Bragg reflection. Scanning angle, photon energy, or distance along a wedge profile in the sample permits scanning the resultant standing wave field through nm-scale structures and analyzing the depth distribution of their chemical, electronic, magnetic, and structural properties. Using harder x-ray excitation permits via the higher kinetic energy of the electrons studying those properties at greater depths. The systems discussed will be two related to magnetic tunnel junctions (magnesium oxide/iron and STO/LSMO), and one related to integrated circuit production (titanium nitride on silicon).

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