

Visualization of buried interfacial nanostructures using photoelectron emission microscopy

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We have performed the visualization and nanospectroscopy (nano-XAFS) of buried interfacial Au nanostructures using hard x-ray photoelectron emission microscopy (PEEM). The hard x-ray PEEM has an advantage of relatively large probing depth with high spatial resolution. The hard x-ray experiments were performed at the undulator beamline BL39XU of the SPRING-8. The 20 nm thick Au nanostructures covered by a Co capping layer, shown in Fig.1(a), were fabricated by electron beam lithography, Au sputtering, lift-off, and Co sputtering. Figure 1(b) shows the chemical contrast of the buried Au nanostructures with the 50 nm thick Co capping layer observed by hard x-ray PEEM near Au L-edge. The buried interfacial Au nanostructures were clearly imaged for Co capping layers of up to 200 nm. It should be noted that the probing depth of chemical contrast was estimated to be as large as 300 nm, while that of nano-XAFS was 25 nm.

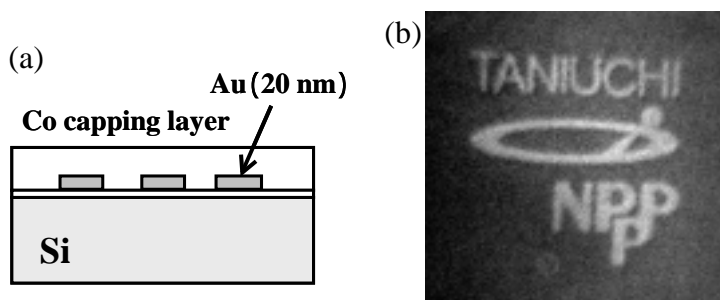


Fig. 1 (a) Cross-sectional schematic diagram of the buried interfacial Au nanostructures. (b) Hard x-ray PEEM image of buried Au nanostructure. The thickness of the Co capping layer is 50 nm.