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ABSTRACT

XPS Study of Nanostructured Surface-Co on Si(100)

Different coverage of Cobalt from ~0.5ML to ~10ML were deposited on clean Si(100) and H-terminated Si(100) surfaces at room temperature. A strong thickness dependence of the correlation-induced satellite signal in Co 2p photoemission spectra was observed. It was found that relative photoemission intensities of the satellite to Co 2p peak increase when the Co film [on Si(100)] thickness increases. After the Co film was annealed up to 450^{o}C, the satellite disappears. The results can be explained from the intermixing influence of d-d electronic interaction and Si 3p-Co 3d bonding on such reduced-dimension systems.

On the other hand, the evolution of ultra-thin Co films on clean and H-terminated Si(100) surfaces upon annealing temperature in the range from room temperature to 650^{o}C was studied by means of core-level and valence-band in-situ X-Ray Photoemission Spectroscopy (XPS). ~2ML to ~8ML Co was deposited onto Si surface at room temperature and then annealed. The behavior of the Co-Si interfaces upon the annealing temperature was examined using Co 2p core level shifts and valence band measurements. By comparing the experimental with theoretical $CoSi_2$ and CoSi band structure, together with the investigation of core level shift, the formation of $CoSi_2$ and CoSi is confirmed.

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