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Interfacial reaction of the Co thin films on Si(100) studied by XPS

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The interfacial reaction of Co thin films on Si(100) was studied by XPS (X-ray photoelectron spectroscopy). For 1.2 ML Co overlayers, XPS results showed that a Co silicide was formed at room temperature but changed rapidly to a CoSi phase at annealing temperature of 380℃. After 540℃ annealing followed by 380℃ for 2 min, a homogeneous CoSi2 was observed. For 8ML Co thin film on Si(100), the interfacial reaction layer of the Co silicide between the Co thin film and the substrate at RT is relatively thin compared with the pure Co thin film, which is not involved in the interfacial reaction in depth. Since the Co2Si phase is unstable, the Co2Si and the Co layers change rapidly to a CoSi phase right after annealing at 270℃ and finally the CoSi2 phase forms after annealing at 540℃ for 2 min.. For all coverage, we observed that the CoSi2 phase took only after annealing. The annealing temperature for the CoSi2 phase depends on the thickness of Co thin film.

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