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ELECTRICAL CONDUCTANCE OF SURFACE PHASES ON SILICON

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The surface conductivity of the samples with Si-Au, Si-Na, Si-In Si-Al surface phases and Au/Si(100), Al/Si(100), Sb/Si(100) submonolayer films was measured in ultra-high vacuum by four-point probe method at room temperature on silicon (100). The conductivity of the Si(100)2x1 surface phase was investigated by adsorption of foreign atoms on this surface phase.

The surface phases on silicon are considered as additional conductivity channel on the surface. From this view point, the measured surface conductivity has several components, the main ones are the conductivity through the bulk Si and that through the surface phase. The destruction of the surface phases by adsorbate deposition results in reduction of conductivity due to the disappearing of conducting channel. Some surface phases (Si-Au, Si(100)c(4×12)-Al) enhance the conductivity of the silicon sample, surface phase Si(100)2×3-Na reduces the conductivity, surface phase Si(100)4×3-In has not influence on conductivity. The conductivity of extra thin layer of adsorbate (Al, Au and Sb) on silicon surface depends on the properties of the bulk material of the film and growth mode. The possible mechanism of surface phase electrical conductance is suggested.