

ELECTRICAL PROPERTIES OF NiPdSi AND NiSi

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One of the express-control methods of phase transition and electrical properties of nickel silicides is measuring the sheet resistance, which is a criterion of the electronic quality of the sample and its correspondence to NiSi or NiSi₂ phase.

Thin Ni films with the addition of 10 at. % of Pd and for comparison pure Ni films were deposited on *n*-type (111) Si by dc magnetron sputtering system. The thickness of the deposited film, comprising either Ni or the mixture of Ni and Pd, was about 100 nm. The NiSi and Ni(Pd)Si films were formed by vacuum annealing of metal films on Si substrates in inert gas ambient. The measurement

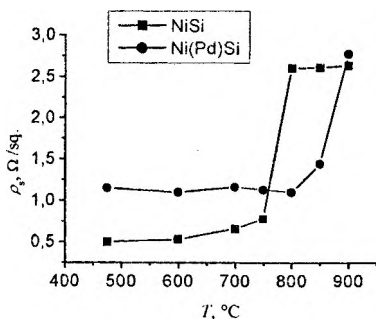


Fig.1. The sheet resistance of NiSi and Ni(Pd)Si films vs. temperature

of the resistance. It is explained by the fact that at interaction of two types of conductors (metals) a series connection is formed, and therefore the values of the resistance are summed up. As it is seen from Fig. 1, a sharp increase (in 2-3 times) of the sheet resistance is noticed in the result of annealing of NiSi film at temperatures higher than 750 °C, which is due to the transformation of the monosilicide phase to the disilicide phase. For Ni(Pd)Si sample we can conclude that nickel monosilicide phase is stable up to 850 °C, as the sheet resistance does not alter much. At 900 °C it increases in two times, indicating that the phase transformation process has started or a severe agglomeration occurred.

Hence, in the extended temperature range it is noticeably better to use Ni(Pd)Si film as its resistance is more stable at higher temperatures.

of the sheet resistance of the pure and alloy nickel silicides was carried out using a four-point probe technique on the device IUS-3M.

The analysis of the results, displayed in Fig.1, shows that NiSi films have low values of the sheet resistance in the temperature range of 475-750 °C. In the same range of temperatures the Ni(Pd)Si films have higher values of the sheet resistance, as it is seen from Fig.1. The higher values of the sheet resistance could be due to the presence of an additional metal (Pd), resulting in an initially higher value