

On the thermal stability of nickel silicides

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Nickel silicidation is one of the important key technologies in modern CMOS fabrication processes because of the superior properties of NiSi, such as low resistance, low silicon consumption and negligible narrow line effects. Although intensive studies have been carried out since Ni silicidation was proposed by Morimoto *et al.* [1] in the early 1990's, thermal stability of NiSi films still remains as a major concern. A phase transition from NiSi phase to a relatively high-resistivity NiSi₂ phase can be observed at higher process temperatures. Agglomeration of silicide films also occur at elevated process temperatures. While most NiSi studies have focused on the possibility of thermal stability improvement, we carried out a study on the thermal stability properties of Ni silicides from the viewpoint of the possible causes of thermal instability in NiSi films formed on silicon substrates. Here, we report the results of our studies and discuss the feasibility of Ni silicides in the future CMOS technology.

1. T. Morimoto, H. S. Momose, T. Iinuma, I. Kunishima, K. Suguro, H. Okano, I. Katakabe, H. Nakajima, M. Tsuchiaki, M. Ono, Y. Katsumata, and H. Iwai, *Tech. Digest IEDM* (1991), pp. 653-656.