The Formation of C-49 Modification Titanium Disilicide

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Due to tougher requirements to photocells used for measuring light fluxes in such knowledge domains like ecology, medicine, chromatography, astronavigation and others, a need arises to expand the range of photocells to meet new sensitivity, spectral range and cost specifications. In particular, the need to fix and analyze the UV and visible light by rather cheap and easy-to-make photocells has led to a broader assortment of such devices [1-3].

The pulse photon processing (= rapid thermal annealing - RTA) has found wide use for technological processes of silicide synthesis to solve the problems of micro- and opto-electronics and development of submicron-size LSI and SLSI [4-7].

Titanium silicides were formed by using the method of hardphase reaction of titanium films with silicon. The general sequence of the process operations was as follows: cleaning of a silicon wafer from natural oxide layers, deposition of Ti films and two-layer Ti/TiN films onto wafer surface and conducting the hardphase reaction to form silicide in the region of metal contact with silicon using pulse photon processing.

The Ti and TiN films were deposited in modular setups for magnetron sputtering such as Varian m2i and Endura 5500 PVD of the Varian and Applied Materials Companies, respectively. The pulse photon processing was carried out using halogen lamps on Heatpulse 8108 commercial installation of AG Associates Company (fig.1).

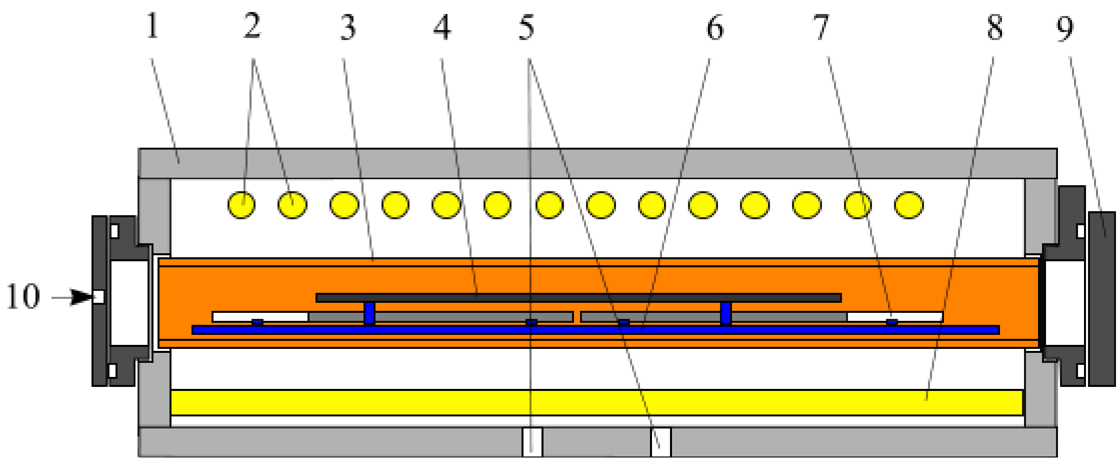

Figure 1. Section of reactor of Heatpulse 8108 setup: (1) water-cooled gold-plated stainless-steel casing; (2) halogen lamps (upper row consisting of 14 pcs), (3) quartz reactor; (4) silicon wafer being processed; (5) optical inputs of temperature control pyrometers (2 pcs); (6) quartz wafer holder; (7) silicon shields (3 pcs); (8) halogen lamps (lower row consisting of 14 pcs); (9) charging door of reactor; (10) gas supply input.

The synthesis of titanium disilicide films was performed on КДБ 12 wafers without implantation as well as on boron doped wafers, 12 Ohm·cm substrates implanted by As (N+) with various implantation dozes such as $5 \cdot 10^{15}$ cm^2, $3 \cdot 10^{15}$ cm^{-2} and $1 \cdot 10^{15} cm^{-2}$. The alloy was the formation by annealing in a reactor at 600°C, 620°C and 650°C for 30 second.

It possesses luminescent properties and has potential for use in optoelectronics. The band width of luminescence spectrum is determined by the mechanism of radiation in different grain parts in the $TiSi_2$(C49)/Si nanosized thin-film heterostructure.

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