

Modification of the optical properties of the surface of porous silicon by the action of external chemical factors

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The investigation of the influence of various chemical substances on the properties of the surface layer of porous silicon is relevant for the creation of sensors of gaseous and liquid impurities. In work, the decoration by isopropyl alcohol of the surface of the porous silicon with different porosity was studied by ellipsometry. The obtained ellipsometric data were processed in a single-layer model. It was found that a thin transparent film exists on the surface of porous silicon. This film is modified porous silicon, the porosity of which is greater than the porosity of the base substance by approximately 6%. The refractive index n and thickness d of this film were obtained as a result of such simulation. The decoration of porous silicon samples by isopropyl alcohol was carried out for one day. Then ellipsometric measurements were performed for two months at some intervals when these samples were in the air atmosphere. It was found that when the porous silicon is kept in isopropyl alcohol, the pores of the transparent film on the surface of the samples are filled with alcohol molecules. As a result of this process, the refractive index of the modified layer decreases, and its thickness increases slightly. It is assumed that this behavior of the refractive index of the modified layer is due to the oxidation processes of free silicon, which forms the pore framework.

Topics

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