MODEL OF ABSORBING LAYER ATTACHED TO SILICON SHOCK FRONT

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In the experiments, the brightness temperature of shock-compressed silicon was measured. The range of investigated shock compression pressures P=(70 - 510) GPa. Measurements were made in the visible and infrared region of the spectrum, in which silicon absorption is low. It has been obtained that brightness temperatures are significantly, up to 5 times lower than those calculated by the available equations of state. To explain the effect, model experiments were carried out on the transmission of powerful, $\sim 5\,\mathrm{MW}/cm^2$, radiation of argon and xenon explosion lamps through a sample of silicon. It was found that the absorption coefficient of silicon increases when exposed to powerful radiation. A model of the phenomenon has been developed that takes into account photoionization of silicon and diffusion of carriers into the sample volume. It is shown that photo-ionization is not sufficient to explain the lowering of the brightness temperature of the moving shock-wave front. The results of measuring silicon absorption coefficients in thin layers adjacent to the shock front with a time resolution of 200 ps are presented. The model of absorbing attached layer in which charge carriers are transferred by diffusion is proposed.