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## Abstract

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# DESTRUCTION OF COLOR CENTERS IN NaCl SINGLE CRYSTALS DURING SHOCK COMPRESSION

*(Presented by Academician V. N. Kondrat' ev on 12 V 1969)*

Recently the possibility of the generation of point defects in single crystals by a shock-wave front has been pointed out repeatedly ([1]). This assertion is usually associated with the strong plastic deformations that a substance undergoes in a shock transition, since the latter lead to the creation of positive and negative ionic vacancies, as well as their simplest aggregates ([2,3]).

In specimens of MgO preserved after shock compression it proved possible to detect $F$ centers ([4]), and also to observe a noticeable increase in the bleaching rate under irradiation with white light of preserved NaCl crystals containing $F$ centers ([5]).

However, preserved specimens, along with the action of the shock-wave front, are subjected to intense plastic deformations in the rarefaction wave; therefore the question of experimental confirmation of defect generation by the shock-wave front remains open.

Since the bleaching rate of colored crystals is proportional to the concentration of traps present in them—for example, vacancy aggregates that absorb optically excited electrons of $F$ centers—it is of interest to observe directly the absorptive capacity of single crystals containing $F$ centers during shock compression.

Color changes in NaCl single crystals colored at a $Co^{60}$ source with a dose of 0.75 Mrad and subjected to shock compression along the [100] axis were recorded by the light-reflection method ([6]) on an SFR-2 instrument using DS-2 color photographic film, which, in order to increase its photosensitivity, was treated by the method of the Central Scientific-Research Institute of Geodesy, Aerial Photography, and Cartography ([7]). The crystal was irradiated by an explosive argon light source through a Plexiglas filter.

The scheme of the experimental setup and the photographic chronogram of the process of passage of the shock wave through the crystal are given in Fig. 1 (see insert to p. 975). It follows from the experiments that irradiation of the crystal by the intense light of the argon source for $\sim$ 13 $\mu$sec does not lead to appreciable bleaching, which, however, occurs when the shock wave enters the specimen in times less than 0.5 $\mu$sec. We note that when the shock-wave front propagates through the auxiliary colorless crystal 3, no color changes are recorded.

Bleaching of the crystals during shock compression was observed for pressures $p = 30$ and 180 kbar. If for $p > 60$ kbar this phenomenon can be explained by a shift of the absorption band of $F$ centers under compression ([8]), then bleaching at $p \approx 30$ kbar must be associated with the appearance of a large number of electron traps in the shock-wave front, since thermal bleaching under these conditions is excluded ([9]). (According to

(10); at $p \approx 30$ kbar the temperature of the NaCl crystal in the shock wave increases by 20°.)

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*Note: Figure translations are in progress. See original paper for figures.*