

Article ID: 1003-7837(2005)02,03-0147-02

Influence of small doses ultra-violet radiation on motion of dislocation in alkali-halide crystals*

Victor A. Feodorov, Tatjana. N. Plushnikova, Andrey V. Chivanov,
Margarita V. Chemerkina, Roman A. Kirillov.

(Department of general physics, Derzhavin Tambov State University, Tambov State University, Tambov, 392622, Russia)

CLC number: 0613.4 Document code: A

Abstract: The purpose of this work was research into influence of ultra-violet radiation on size of run of regional and screw dislocations in beams of dislocation sockets, formed at indentation surface of alkali-halide crystals. In experiments it was used crystals NaCl, with the quantitative maintenance of impurity $10^{-2} - 10^{-3}$ weight %, the wave length of UV-radiation $\lambda = 250$ nanometers, the sizes of samples $10\text{mm} \times 20\text{mm} \times 2\text{mm}$, temperature of samples was constant $T = 290$ K.

It is established that indentation and the simultaneous irradiation of samples a ultraviolet is increases size of run of head dispositions in dislocation sockets.

It is marked, that influence UV-radiation nonequivalence for various times of an exposition. At small times (till 5 minutes) the size of run grows. The length of beams increases on $\sim 50\%$. At the further increase in time of influence of a ultraviolet the length of beams is reduced till the sizes corresponding stressing without an irradiation (Figs. 1, 2, 3). The effect is observed on dislocation beams of regional and screw orientations and most expressed at small loadings (in our experiments-10 grams) (Fig. 3).

Observable effects are explained from positions dislocation-exciton interactions. At UV-radiation exciton cooperates with the charged step on a disposition, causing movement of a step along a disposition on one internuclear distance. Due to this interaction overcoming by a disposition of a grid of stoppers is facilitated. Big times of endurance cause a relaxation of pressure directly in a print that provides convertible movement of dispositions in area of a print and as consequence, reduction of length of beams of dislocation sockets.

Received date: 2005-08-29

* Foundation item: Project supported by the grant of RFBR (05-01-00759)

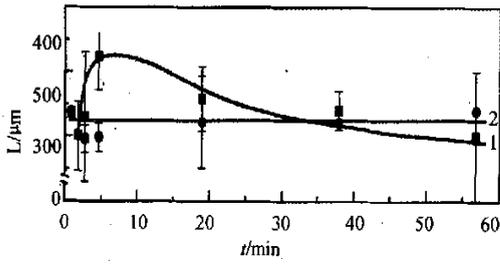


Fig. 1 Dependences of change length beams for regional dislocation in crystals NaCl on time of influence UV radiation (load is 40 grams)
1—radiated crystal; 2—crystal without radiation

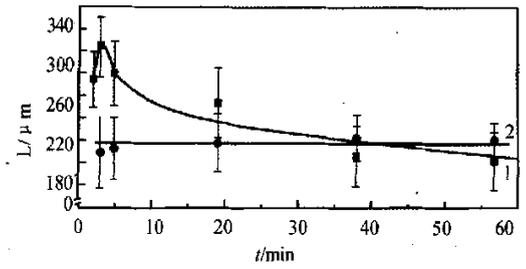


Fig. 2 Dependences of change length beams for regional dislocation in crystals NaCl on time of influence UV radiation (load is 20 grams)
1—radiated crystal; 2—crystal without radiation.

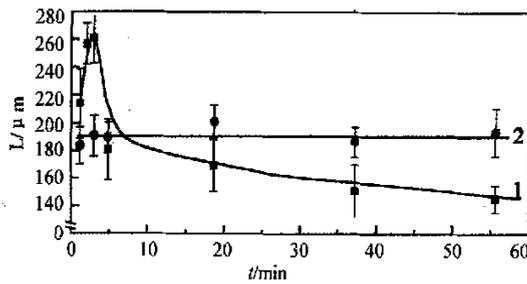


Fig. 3 Dependences of change length beams for regional dislocation in crystals NaCl on time of influence UV radiation (load is 10 grams)
1—radiated crystal; 2—crystal without radiation.