3. CONCLUSIONS

From the considerations given in section 2 the following conclusions can be drawn as to the luminescent properties of crystals conditioned by excitons produced during the transition of fast charged particles through a crystal.

During the production of excitons with negative effective mass the exchange of energy between the exciton and the oscillations of the crystal lattice is accompanied by an increase in the wave number of the exciton [4]. As a result of this the transfer of the exciton energy into light energy is hampered since the wave vector of the exciton does not correspond to the wave vector of the light wave. This means that the lifetime of the exciton will increase due to irradiation which can only result in a difference between the period of fading of the luminescence conditioned by the radiant annihilation of the exciton produced during the transition of particles through the crystal and the period of fading of luminescence conditioned by the exciton produced during optical excitation of the crystal.

Triplet excitons can also be produced during the transition of electrons through a crystal under certain conditions. This means that under these conditions metastable states with fairly long lifetime can be produced in the crystal, which can even lead to a luminescence different from that conditioned by an exciton produced by optical excitation of the crystal.

Received 24. 6. 1957.

СВОЙСТВА ЭКСИТОНОВ, ОБРАЗОВАВШИХСЯ ПРИ ПРОХОЖДЕНИИ БЫСТРЫХ ЗАРЯЖЕННЫХ ЧАСТИЦ ЧЕРЕЗ КРИСТАЛЛ

(Содержание предыдущей статьи)

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Изучаются свойства экситонов, образовавшихся при прохождении быстрых заряженных частиц через кристалл в результате кулоновского взаимодействия частиц с электронами кристалла. Показаны некоторые свойства этих экситонов, отличные от свойств экситонов, образовавшихся при оптическом возбуждении кристалла, и их возможное влияние на люминесценцию кристалла, вызванную излучательной аннигиляцией экситона.

Поступило 24. 6. 1957.

References — Литература

- [1] Frenkel I.: Phys. Rev. 37 (1931), 17, 1276.
- [2] Seitz F.: The Modern Theory of Solids, McGraw-Hill, New York (1940).
- [3] Heller W. R., Marous A.: Phys. Rev. 84 (1951), 809.
- [4] Давыдов А. С.: Теория поглощения света в молекулярных кристаллах. Труды Института физики А. Н. УССР, 1 (1951).
- [5] Merrifield E.: J. Chem. Phys. 23 (1955), 402.