PHYSICAL PROCESSES OF IMAGE FORMING IN LUMINESCENT MATERIALS ON THE BASIS OF ANTHRACENE

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S u m m a r y

The work is devoted to the investigation of the physical processes of the relaxation of excitation in the molecules of peroxide and, in particular, of mechanisms of the dissociation of a molecule from the basic and excited states. The theoretical and experimental investigations of the processes proceeding in the luminescent materials on the basis of anthracene (the solid polymeric solutions and the polycrystalline layers of anthracene) show that the primary process of recording of the information is the process of oxidation with the formation of anthracene peroxide. Then, in solid solutions, the dissociation of peroxide on the initial products occurs, while the further transformation of peroxide into anthraquinone is carried out in polycrystalline layers. The study of the properties of peroxide in the basic and excited states has shown that its thermal dissociation results in the detachment of the oxygen molecule overcoming the barrier $\sim$ 1.2 eV. Lengthening the C—O-bond above 0.25 nm is accompanied by the crossing of the basic singlet state with the triplet one located on the same bond. As a result of the dissociation, an anthracene molecule in the singlet state and a molecule of oxygen in the triplet state are formed. The excitation of a peroxide molecule by capture of an exciton with the subsequent relaxation of excitation results in its localization in the triplet dissociative state located on the O—O-bond. At lengthening the bond up to 0.2 nm, the triplet state becomes the basic state of the molecule, of which anthraquinone is formed after the detachment of two atoms of hydrogen. The last, interacting with the excited molecules of anthracene, forms the charge-transfer complexes that efficiently extinguish the exciton fluorescence.