ФИЗИКА

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The features of spectroscopic properties of alkali halide crystals exposed tolow-temperature uniaxial elastic deformation [1]

Abstract: the nature of luminescence and the mechanisms of radiation defect formation in alkali halide crystals (AHC) with a decrease in the symmetry of uniaxial low-temperature (85K) deformation are investigated.

In RbI and KI, in contrast to CsI, an increase in X-ray luminescence was experimentally recorded: both σ-STE(maxima at 3.9 eV and 4.16 eV, respectively) and π-STE (maxima at 2.3 eV and 3.3 eV) luminescence, and E_x-luminescence(3.1 eV and 3.05 eV). Based on the correlated growth of E_x - and intrinsic σ, - π-luminescence's of crystals, the nature of E_x - luminescence in RbI and KI is interpreted as the STE'sintrinsic luminescence with a weak off-center asymmetric configuration.

In RbI and KI, the reducing effect ofcreating stable radiation defects efficiency was found, which was interpreted based on a comparison of the interstitial void and the H-center sizes in AHC.

The enhanced effect of STE luminescence in KI and RbI with a decrease in the efficiency of radiation defect formation is interpreted by the spatial tightness of the interstitial void to stabilize the H-center.

Keywords: alkali halide crystals; luminescence; self - trappedexcitons; elastic uniaxial deformation; radiation defects; the radius of aninterstice.

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Introduction. At present, the fundamental understanding of the relaxation processes of electronic excitations (EEs) in alkali halide crystals (AHCs) resulting in the radiative channel (luminescence) or the creation of primary radiation defects, F, H and α - I pair of Frenkel defects (nonradiative decay channel) has been achieved [1 - 3]. These two competitive channels of EE relaxation originate from the states of anion self - trapped excitons (STEs), which are very sensitive to the local symmetry of immediate lattice surrounding [2 - 4].

To study these EE annihilation channels in AHCs, one must consider that the pre-decay STE state corresponds to the $X_2^- e^-$ formation. Therefore, a STE hole component and a self-trapped hole (V_K center) by itself have similar structure - a $(X_2^-)_{aa}^+$ two - halide molecule occupying two adjacent

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anion sites and oriented along <110> or <100> directions in *fcc* and *bcc* AHCs, respectively [1 - 3]. Depending on the X_2^- symmetry with respect to anion sites involved, three different STE types are considered in AHCs, namely symmetric (on-center), weakly and strongly asymmetric (weak or strong off-center) configurations [5].

CsI, RbI, KI and KCl crystals were purposefully chosen as objects of research.On the one hand, these are previously well-studied crystals, for which the basic laws of relaxation of excitations have been studied in great detail.On the other hand, they differ significantly in many properties, including the efficiency of migration of EEs, the efficiency of creating deforming defects, sensitivity to radiation, etc.At a temperature of 80 K, the mean free path of anionic excitons to self-trapping in a series of CsI (350 a) crystals differs significantly $\longrightarrow$ KI (235 a) $\longrightarrow$ RbI (150 a) $\longrightarrow$ KCl ($2a$), which is extremely important for the study of luminescent properties, simultaneously with the efficiency of the formation of radiation defects in AHC (a - the lattice constant).

Thus, we propose an original study of the purposeful effect on the pre - decay states of STEs or exciton-like formations (bound excitons) in AHCs by reducing the symmetry of their immediate lattice surrounding via applied low - temperature uniaxial elastic deformation.

The proposed comprehensive study of EE annihilation channels in AHCs enables to control their efficiency that is extremely important for the elaboration of new functional materials. The AHCs are traditionally used as dosimeters/detectors of ionizing radiation and scintillation detectors [6, 7], the operation principles of which are closely related to the above-mentioned competitive channels of EE annihilation.

Recently, it has become relevant to attract AHCs in cryodetectors for dark matter registration [8 - 10] and to the testing of modern equipment for the study of thermally stimulated luminescence (TSL) and exo-electron emission [11].

Thus, by lowering the lattice symmetry via various types of deformation applied to AHCs, it is possible to purposefully effect on the pre-decay STE statesand, thereby, control the channels of radiative annihilation with luminescence and non-radiative decay into primary radiation defects.

Experimental technique and research objects. Scanning of the X-ray luminescence (XRL) spectra of the crystals was performed using a high - power monochromator MSD - 2 and a photoelectronic multiplier of the type H 8259 of the company "Hamamatsu", operating in the photon counting mode by the controlled program SpectraSCAN [12 - 13].

Scanning of absorption spectra of radiation defects AHCs was carried out on the basis of the Evolution - 300 spectrophotometer of the "Thermo Scientific" company with VISION 32 PRO software in the spectral range of 190 - 1100 nm (6.5 - 1.1 eV).

XRL spectra were recorded using a RUP - 120 X - ray unit (W, 3mA and 100 kV).

Uniaxial low-temperature deformation of the crystals was carried out in a special cryostat [14].The cubic AHC structure enables a unique opportunity to apply a uniaxial deformation strictly along <110> and <100>crystallographic directions, which coincide with the STE orientation in *fcc* and *bcc* AHCs, respectively.

The RbI, KI and CsI crystals used were synthesized at the Institute of Physics of the University of Tartu, as well as commercial CsI crystals from "Epic-Crystals" company were specially oriented in Tartu.

Thermal quenching of crystals was carried out in the electric muffle furnace "Programix - TX - 25".

Experimental results. Long - term experimental studies on the relaxation of EEs in AHCs with reduced lattice symmetry have shown that low - temperature uniaxial elastic deformation increases the probability of EE self-trapping in regular lattice sites with their subsequent radiative relaxation [15-17].

In this regard, detailed studies of the dependence of the intrinsic luminescence intensity of RbI, KI and CsI crystals on the degree of applied elastic deformation produced at 85 K have been carried out.

It is known that three luminescence bands with maxima at 3.9 eV and 2.3 eV (σ - and π - components of STE emission, respectively) as well as at 3.1 eV (the so-called E_x luminescence), could be registered in RbI crystals at 4.2 K [1 - 3].

To date, the nature of E_x luminescence in RbI (and also in KI) crystals has been vigorously discussed, at least two points of view exist. Most researchers believe that E_x luminescence is the intrinsic luminescence of STEs with a weak - off configuration [18, 19], while in some publications the E_x luminescence is referred to the emission of EEs involving a light sodium cation in the RbI lattice [20, 21].

Figure 1 *a*, *b* demonstrates the effect of uniaxial elastic deformationapplied to RbI crystals at 85 K on the XRL spectra.The spectrum of an undeformed sample (Fig. 1a) contains an emission band peaked at 3.9 eV and related to the σ - STE luminescence. Note that this detectable band is partially quenched with respect to that at 4.2 K, while the intensities of two other emissions, π - STE (2.3 eV) and E_x (3.1 eV) are negligible at 85 K. The thermal quenching of STE luminescence in all AHCs occurs at $4.2 \longrightarrow 85$ K and causes a sharp drop of luminescence quantum yield with temperature.

According to Fig. 1 *a*, the elastic uniaxial deformation applied to a RbI crystal at 85 K, increases the intensity of the σ - STE luminescence by more than 8 times. In addition, even the E_x (3.1 eV) and π - STE emissions (2.3 eV) are detectable in the deformed sample. The elastic and plastic deformation boundary can be determined experimentally from the end of a linear stage (where Hooke's law is fulfilled) of luminescence intensity dependence on the deformation degree ε (see insert in Fig. 1 *b*).

Based on the correlated increase in the intensity of the E_x and σ - STE luminescence with a decrease in the lattice symmetry, it can be concluded that the E_x luminescence in RbI is of intrinsic nature, corresponds to the radiative STE decay and is not associated with the presence of sodium impurity, as many researchers assumed [20, 21].

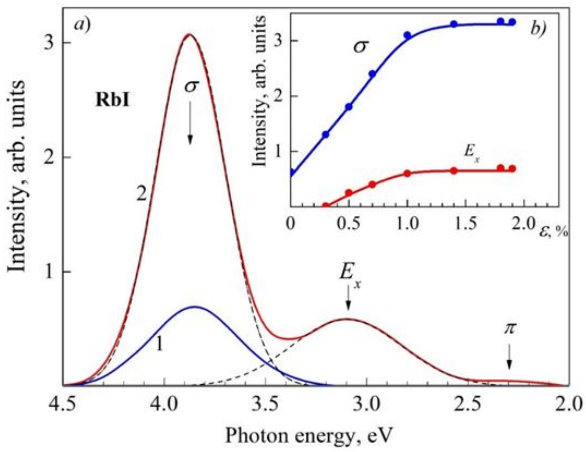

FIGURE 1 – *a)* The XRL spectra of a RbI crystal measured at 85 K without (curve 1) and under applied uniaxial elastic deformation with ε = 0.8-1.0% (curve 2). Dashed lines demonstrate the spectrum decomposition into elementary Gaussians.
b) Dependence of the intensity of σ - STE (3.9 eV) and E_x luminescence (3.1 eV) on the degree of deformation ε at 85 K.

Similar to RbI crystals, three luminescence bands with maxima at 4.16 eV (σ - STE), 3.05 eV (Ex) and 3.31 eV (π - STE) were detected in KI crystals at 4.2 K [1-3].

Figure 2 *a*, *b* demonstrates the effect of uniaxial elastic deformation applied to KI crystals at 85 K on the XRL spectra. According to Fig. 2 *a*, the E_x luminescence (3.05 eV) dominates at 85 K

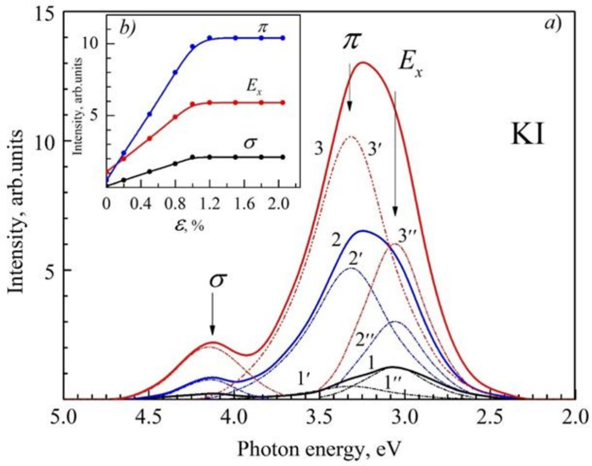

FIGURE 2 – *a)* The XRL spectra of a KI crystal measured at 85 K without (curve 1) and under applied elastic uniaxial deformation with ε = 0.5% (curve 2) and ε = 1% (curve 3). Dashed lines demonstrate the spectra decomposition into elementary Gaussians.
b) The dependences of the intensityof σ - STE (4.16 eV), π - STE (3.31 eV) and E_x (3.04 eV) luminescence on the degree of uniaxial deformation in KI at 85 K.

in the XRL spectrum of an undeformed sample, while the π and σ components of STE emission are rather weak. With an increase in the degree of relative deformation to $\varepsilon = 0.5\,\%$,a fraction of the π - STE luminescence at 3.31 eV reaches maximum with respect to the E_x (see curve 3). At a subsequent rise to $\varepsilon = 1.0\,\%$, a simultaneous enhancement of the E_x and π - STE emissions take place, while the rates of rise are different.

The dependence of the π - STE intensity on the degree of relative deformation for a KI crystal consists of two stages (see Fig. 2*b*). The first stage of $I = f(\varepsilon)$ up to $\varepsilon = 0.5\,\%$ displays a linear stage where Hooke's law and elastic deformation origin are valid. At higher ε values, the dependence $I = f(\varepsilon)$ demonstrates saturation typical of a region of crystal plastic deformation. The similar two-stage dependences of $I = f(\varepsilon)$ have also been obtained for the σ - and π - STE emissions (4.16 and 3.31 eV, respectively - see Fig. 2 *b*).

As it was already mentioned for RbI, there is no consensus on the nature of the E_x luminescence in KI crystals. Some researchers believe that the E_x in KI is of intrinsic origin and belongs to STEs with a weak-off configuration [5, 17, 22], while others connect the E_x emission with sodium-impurity-related EEs [23, 24]. The presence of a linear stage of $I = f(\varepsilon)$ dependence for all three luminescence types demonstrated in Fig 2*b*, confirms that the E_x luminescence in KI is of intrinsic origin as well.

The intrinsic luminescence of a CsI crystal at 4.2 K consists of two bands with maxima at 4.27 and 3.67 eV, which are ascribed to the radiative relaxation of STEs with π and σ polarization and half-width of 0.32 and 0.37 eV, respectively [5, 25, 26]. Note that only the 3.67-eV luminescence is not quenched at 85 K. Apparently, the changes in the spectral composition of CsI luminescence with temperature are connected with different STE configurations. Therefore, these STE configurations can be separated via the effect of uniaxial deformation on the XRL spectra of CsI crystals.

Figure 3 *a* shows the XRL spectra measured at 85 K for a CsI crystal without (curve 1) and under applied uniaxial deformation with $\varepsilon = 0.5\ \%$ (curve 2). In agreement with [25], only one emission band at 3.67 eV should be detectable at 80-85 K, i.e. at our experimental conditions. However, two luminescence bands with maxima at 4.27 eV and 3.67 eV have initially been detected at 85 K under hard X-ray excitation that penetrates through entire thickness of our CsI sample.

According to the results presented in Fig. 3*b*, the applied uniaxial deformation in the region of elasticity causes the intensity redistribution between elementary emission bands with the rise of ε value. The enhancement of the 3.67 - eV luminescence, which is accompanied by simultaneous quenching of the emission at 4.27 eV, occurs linearly up to $\varepsilon = 0.9\,\%$ (i.e. in the region of elastic deformation) and after that becomes independent on the degree of relative deformation. In our opinion, the XRL band at 3.67 eV is connected with asymmetric (weak off) STE configuration, while the 4.27-eV Gaussian is caused by the radiative decay of on-STE configuration.

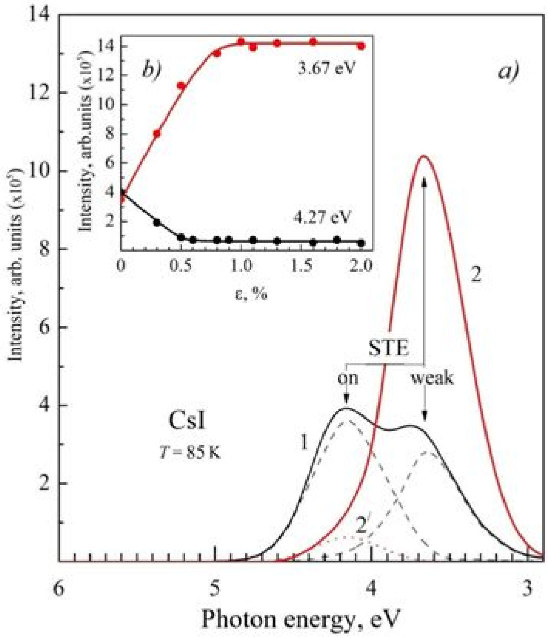

FIGURE 3 – *a)* The XRL spectra of a CsI crystal measured at 85 K without (curve 1) and under applied uniaxial elastic deformation with $\varepsilon = 0.5\%$ (2). Dashed lines demonstrate the spectrum 1 decomposition into elementary Gaussians.Curve $2'$ - is a residual fraction of the spectrum 2 with respect to the π - STE Gaussian.
b) The dependences of the intensity of the emission bands peaked at 3.67 eV (curve 1) and 4.27 eV (curve 2) on the degree of uniaxial deformation at 85 K.

Thus, the directed effect on the pre - decay states of anion STEs allows a thorough study of the radiative relaxation of EEs in order to develop functional materials with specified optical characteristics, in particular, fast AHC - based scintillation detectors.

On the other hand, the experimentally detected enhancement of luminescence intensity in elastically deformed RbI, KI, and CsI crystals could be accompanied by a reduced efficiency of radiation defect creation - this decay channel also starts from the anion STE state.

This assumption has been experimentally verified in KI crystals by means of optical absorption method. As it can be seen in Fig. 4*a*, the concentration (proportional to absorption band integral) of radiation defects in an elastically deformed KI crystal (curve 2) is by more than an order of magnitude lower than that in an undeformed sample (curve 1). For a correct comparison of the concentration of radiation-induced defects (α , F, V_2 centers), the crystals were exposed to isodose irradiation by X-rays at 85 K, both without and under applied uniaxial stress.

The insert in Fig. 4 presents the accumulation of stable F centers with X-ray irradiation dose in an undeformed KI (curve 1) and the sample exposed to elastic deformation along <100> crystallographic direction with $\varepsilon = 1.0\,\%$ (curve 2). It is clearly seen that accumulation rates are rather different.

Note that the applied low-temperature elastic deformation causes the changes in fundamental absorption spectrum of a KI crystal. The edge of the fundamental absorption in an undeformed crystal (curve $1'$ in Fig. 4 *a*) is shifted toward a low-energy side with respect to that in a uniaxially deformed KI crystal (curve $2'$).

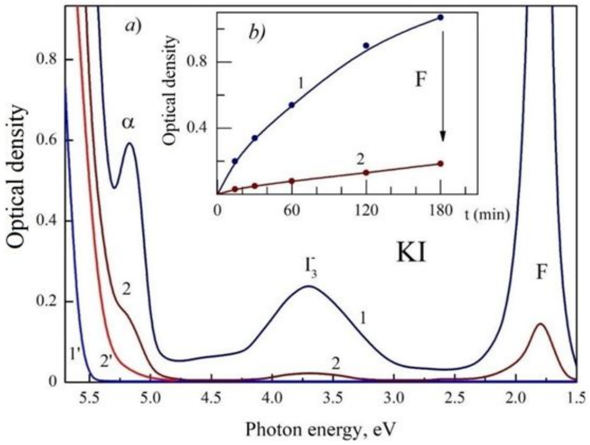

FIGURE 4 – *a)* The absorption spectra of a KI crystal measured at 85 K before (curves 1′ and 2′) and after isodose (3 hours) X - ray irradiation at 85 K (curves 1 and 2). The spectra correspond to an undeformed crystal (curves 1′ and 1) and the sample exposed toa uniaxial stress with $\varepsilon = 1.5\%$ at 85 K (curves 2′ and 2).
b) Accumulation of the F - centers with X - ray dose in a KI crystal without (curve 1) and under applied uniaxial deformation along <100> direction at 85 K ($\varepsilon = 1.0\%$, curve 2).

Thus, it can be assumed that the observed weakening of the radiation creation of stable radiation defects in the elastically deformed KI crystal is connected with the reduction of a crystal lattice point symmetry from O_h to D_{4h} .

To illustrate the competition between the enhancement of luminescence intensity and decrease in the efficiency of radiation defect creation in elastically stressed KI and RbI crystals, a stoichiometric model that considers the elastic deformation parameters in *fcc* (NaCl type) and *bcc* (CsCl type) AHCs (see Fig. 5 *a,b*) has been developed.

According to the AHC model, lattice anions (X^-) are assumed to be "elastic" ones due to external orbitals, while both cations (M^+) and halogen atoms (X^0) are non-deformable rigid skeletons as indicated in Fig. 5 *a, b*.

To estimate the efficiency of radiation defect creation, it is necessary to determine the size (radius) of an interstice needed for the location of a primary radiation defect (H - centers) during lattice stabilization. The maximum value of interstice (R_{max}) suitable for the H center location is determined by the elasticity of anions [27], while the size of the H center is determined by the halogen atom radius (R_a^0).

At $R_{max} > R_a^0$, there is a favorable situation for the formation of an H center in the lattice resulting in the increased efficiency of radiation defect formation in AHCs. On the other hand, if $R_{max} < R_a^0$, a halide atom (i.e. an$H$ center) does not fit interstice size, thus the efficiency of radiation defect creation is reduced (typical of *bcc* AHCs).

The value of interstice R_{max} that depends on the degree of elastic uniaxial deformation (ε) can be determined as follows:

$$R_{max} = \frac{a^2 - 4(R_c^+)^2}{8R_c^+ + \frac{4a}{\sqrt{1+(1-\varepsilon)^2}}} \quad (1)$$

The numerical value R_{max} at the absence of deformation ($\varepsilon = 0$) can be obtained from equation (1):

$$R_{max} = \frac{a^2 - 4(R_c^+)^2}{2\left(4R_c^+ + \sqrt{2}a\right)} \quad (2)$$

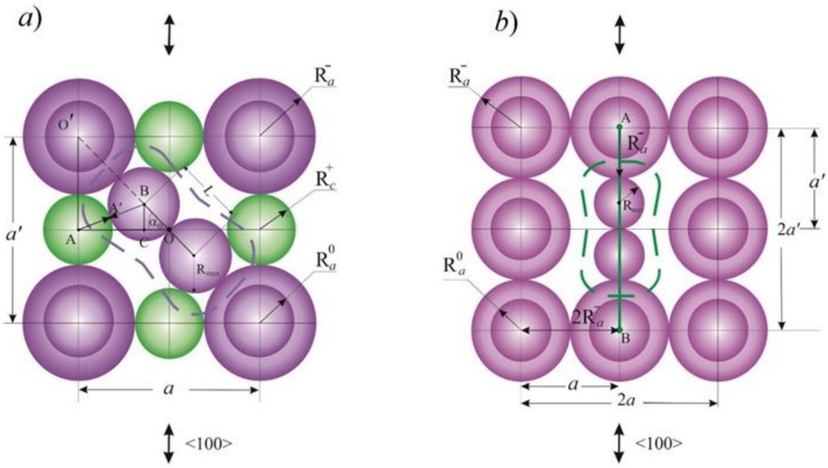

FIGURE 5 – A stoichiometric model describing the stabilization of an H center in *bcc (a)* and *fcc (b)* AHC lattice.

If we assume that the maximum interstice radius is equal to the H center radius ($R_{max} = R_a^0$), the threshold value of ε_{max} , which, in turn, characterizes the boundary condition for the efficient defect creation in AHCs, can be defined as:

$$\varepsilon_{max} = 1 - \sqrt{\left[\frac{4aR_a^0}{a^2 - 4\left(R_c^+\right)^2 - 8R_c^+ R_a^0}\right]^2 - 1} \qquad (3)$$

The calculated values of R_{max} and ε_{max} (%) for a number of AHCs are presented in Table 1.

TABLE 1 – Lattice parameters for *bcc* and *fcc* AHCs: a - lattice constant, R_a^0 - the radius of the atom [28], R_{max} - the maximum radius of interstice to accommodate the H center, R_{max} / R_a^0 - the ratio of the radii of an anion and an H center, ε_{max} - the maximum ε value (in %) at which the H center still fits an interstice ($R_{max} = R_a^0$).

Crystal	a,(Å)	R_a^0, (Å)	R_{max}, (Å)	R_{max} / R_a^0	ε_{max} (%) at $R_{max} = R_a^0$
RbI	7.342	1.4	1.377	0.983	-5.13
KI	7.066	1.4	1.399	0.999	-0.16
KBr	6.597	1.15	1.243	1.081	24.41
KCl	6.293	1.0	1.143	1.143	43.18
CsI	4.57	1.4	1.1	0.79	-13.6
CsBr	4.3	1.15	0.98	0.85	-8.7
CsCl	4.11	1.0	0.905	0.905	-5.2

It follows from Table 1 that the H center stabilization within an interstice is unprofitable even in undeformed RbI and KI crystals because $R_a^0 > R_{max}$. On the other hand, the inequality $R_{max} > R_a^0$ is valid in KBr and KCl crystals up to high values of deformation degree (ε_{max} equals 24.41% and 43.18% , respectively). Therefore, in contrast to RbI and KI (with even negative calculated values of ε_{max}), the efficiency of radiation defect creation does not decrease in KBr and KCl crystals exposed to uniaxial elastic deformation.

In CsI crystals, the intensity of XRL at 3.7 eV related to weak off-configuration of STEsdecreases under applied elastic uniaxial deformation (see Fig. 3). Therefore, similar to KI and RbI crystals, the efficiency of defect creation in an elastically deformed *bcc* CsI crystal should also decrease.

According to Fig. 5 *b*, the H center in CsI is oriented along <100>. Therefore, in *bcc* crystals we should consider applied compression/stretching along the same crystallographic direction as:

$$\varepsilon = 1 \pm \frac{a'}{a} \tag{4}$$

Note that $a = 2R_a^-$ and $a' = R_a^- + 2R_{max}$, where a and a' represent lattice constants without and under applied deformation, respectively.

In the absence of deformation, $\varepsilon = 0$ and using the above-mentioned values of a and a', we find R_{max} as

$$R_{max} = \frac{R_a^-}{2} \tag{5}$$

At $R_{max} = R_a^0$, the maximum value of deformation degree equals:

$$\varepsilon_{max} = \frac{1}{2} - \frac{R_a^0}{R_a^-} \tag{6}$$

The calculated values of R_{max} and ε_{max} (%) for three bcc AHCs are presented in Table 1 as well. According to these results, the situation for CsI, CsBr and CsCl crystals is similar to that in RbI and KI *fcc* crystals - $R_a^0 > R_{max}$ even in nondeformed *bcc* AHCs, i.e. additional stretching should be performed (see negative values of ε_{max} in the Table) in order to accommodate a radiation - induced H center into an interstice. Based on the obtained ε_{max} values, we can conclude that the intrinsic luminescence in CsI (ε_{max} = -13.6 %) is more efficient than that in CsBr and CsCl crystals (-8.7 % and -5.2 % , respectively). Obviously, the CsI crystal luminesces better than the CsBr and CsCl crystals.

Conclusion. The enhancement of both the π - component of STE emission and the E_x luminescence (peaked at 2.3 and 3.1 eV or at 3.31 and 3.05 eV in RbI and KI, respectively) has been detected for the first time in the XRL spectra of RbI and KI crystals exposed to elastic uniaxial deformation at 85 K. The intensity of both XRL bands linearly increases with the relative degree of uniaxial deformation up to $\varepsilon = 0.5\,\%$, while the luminescence undergoes saturation at higher values of ε. Such linear dependencies allow to confirm an intrinsic nature of the E_x luminescence connected with the radiative relaxation of STEs in the field of local lattice deformation in RbI and KI crystals.

The simultaneous enhancement of the 3.67-eV luminescence and suppression of the 4.27-eV emission, related to asymmetric (weak off) and symmetric STE configurations, respectively, have been revealed in elastically deformed CsI crystals.

Using optical absorption method, the reduced efficiency of stable defect creation by X-rays has been detected in KI crystals exposed to elastic uniaxial deformation at 85 K.

The reduced efficiency of the H - center radiation creation (in a form of F- H Frenkel pairs) has been explained on the basis of stoichiometric model - by comparing the radius of an interstitial atom (R_a^0) and a radius of an interstice (R_{max}) in *fcc* and *bcc* AHCs. The applied uniaxial stress decreases the interstice volume, and impedes the formation of interstitial - type H centers ($R_a^0 > R_{max}$).

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Төменгі температуралық бір осьті серпімді деформацияланған сілтілі-галоидті кристалдардың спектроскопиялық қасиеттерінің ерекшіліктері

Аннотация. Бір осьті төмен температуралы (85 К) деформация симметриясының төмендеуі кезінде сілтілі-галоидты кристалдардағы (СГК) люминесценция мен радиациялық ақау түзілу механизмдері зерттелді.

RbI және KI кристалдарында(CsI-тан өзгешелігі) рентгенлюминесценцияның күшеюі эксперименталды түрде тіркелді: σ-ӨҚЭ (сәйкесінше 3,9 эВ және 4,16 эВ), π - ӨҚЭ люминесценция (2,3 эВ және 3,3 эВ) және E_x-люминесценция (3,1 эВ және 3,05 эВ). Кристалдардағы E_x - және меншікті σ, - π - люминесценцияларының корреляцияланған өсуіне сүйене отырып, RbI және KI-тағ E_x - люминесценция әлсіз асимметриялық конфигурациялы ӨҚЭ-ның меншікті люминесценциясы ретінде қарастырылады.

RbI және KI - та тұрақты радиациялық ақаулардың пайда болу тиімділігінің төмендеу әсері анықталды, ол СГК-дағы түйінаралықбостық өлшемдерін және H-түйінді орталығын салыстыруға негізделеді.

KI және RbI - та ӨҚЭ люминесценциясын күшейту әсері радиациялық ақаудың тиімділігін төмендету кезінде H-түйінді орталығын тұрақтандыру үшін түйінаралықбостық өлшемдерінің кеңістіктік тарылуымен түсіндіріледі.

Түйін сөздер: сілтілі-галоидті кристал; рентгендік люминесценция; өздігінен қармалған экситон; серпімді деформация; радиациялық ақаулар; түйінаралық бостық радиусы.

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Особенности спектроскопических свойств щелочно-галоидных кристаллов при низкотемпературной упругой деформации

Аннотация. Исследованы природы люминесценции и механизмов радиационного дефектообразования в щелочно-галоидных кристаллах (ЩГК) при понижении симметрии одноосной низкотемпературной (85К) деформации.

В RbI и KI, в отличие от CsI, экспериментально зарегистрировано усиление рентгенолюминесценции: как σ - АЛЭ (максимумы при 3,9 эВ и 4,16 эВ, соответственно) и π - АЛЭ люминесценции (2,3 эВ и 3,3 эВ), так и E_x - люминесценции (3,1 эВ и 3,05 эВ). На основании коррелированного роста E_x - и собственных σ -, π - люминесценций кристаллов, природа E_x - люминесценции в RbI и KI интерпретирована как собственная люминесценция АЛЭ с слабо-ассиметричной конфигурацией.

В RbI и KI обнаружен эффект понижения эффективности создания стабильных радиационных дефектов, который интерпретирован на основе сопоставления размеров междоузельной пустоты и H - центра в ЩГК.

Эффект усиления люминесценции АЛЭ в KI и RbI при понижении эффективности радиационного дефектообразования интерпретируется пространственной теснотой междоузельной пустоты для стабилизации H - центра.

Ключевые слова: щелочно-галоидный кристалл, рентгенолюминесценция, автолокализованный экситон, упругая деформация, радиационные дефекты, радиус междоузельной пустоты.

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