INTRINSIC MOLECULAR IONIC CENTERS IN RARE GAS SOLIDS

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Electronically induced formation of intrinsic ionic centers in the configuration of rare gas molecular ions (R_2^+) was studied by low temperature spectroscopy methods. Based on the cathodoluminescence investigation of the ionic excimers (R_2^{2+}) [a], thermoluminescence data on self-trapped holes (R_2^+) [b] and selective excitation by synchrotron radiation of states involved [c], the set of lattice reactions were analyzed: 1) free exciton ionization accompanied by trapping of charge carriers: $R_{ex}^* \rightarrow R_2^+ + e^-$; 2) 'dressing' of trapped hole by exciton with subsequent H-band emission: $R_2^+ + R_{ex}^* \rightarrow R_2^{+*} \rightarrow R_2^* + h\nu(H\text{-band})$; 3) bulk recombination of trapped hole with electron following by exciton self-trapping and M-band emission: ${}^{bulk}R_2^+ + e^- \rightarrow {}^{bulk}R_2^* \rightarrow R + R + h\nu(M\text{-band})$; 4) surface recombination of trapped hole with electron following by desorption of excimers and W-band emission: ${}^{surf}R_2^+ + e^- \rightarrow {}^{desorb}R_2^* \rightarrow R + R + h\nu(W\text{-band})$.

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[b] E. V. Savchenko, A. N. Ogurtsov, S. A. Gubin, O. N. Grigorashchenko, In: Proc. 2nd Int. Conf. on Excitonic Processes in Condensed Matter (EXCON'96) (Dresden University Press, Dresden 1996) p.207-210.

[c] J. Becker, A. N. Ogurtsov, M. Runne, E. V. Savchenko, G. Zimmerer, HASYLAB Annual Report 1996 (DESY, Hamburg 1997) in press.