THERMOLUMINESCENCE OF IMPURITY-HELIUM SOLIDS IMMERSED IN LIQUID HELIUM

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A solidification of liquid helium around impurity particles injected in its volume results in IHSP (Impurity-Helium Solid Phase) formation [a], so these particles can be stabilized with inert environment during long time. Particular interest is stabilization of metastable particles. The capture of N(^{2}D) atoms from discharge allows to save ones at T=1.5 K during 10^4 s - time comparable with their lifetime, 4.4×10^4 s. Nevertheless, even small temperature increase (< 0.1 K) causes the luminescence on the ^{2}D - ^{4}S transition. It was explained as thermoactivated association of neighbouring centers of IHSP, N+N_2 or N+Rg, which partially removes the prohibition because of "heavy particle effect" [b]. The main part of stabilized nitrogen atoms is in the ground state ^{4}S, so thermoactivated mobility leads to the pair recombination N+N or N+O (O_2 presents as trace in condensed gas mixture). The results presented in report confirm that heating of IHSP samples causes a blue emission which can be assigned to excited states of N_2 or NO.

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[a] E. B. Gordon, V. V. Khmelenko, A. A. Pelmenev, E. A. Popov, O. F. Pugachev, A. F. Shestakov, Chem. Phys. 170, 411 (1993).

[b] R. E. Boltnev, E. B. Gordon, V. V. Khmelenko, I. N. Krushinskaya, M. V. Martynenko, A. A. Pelmenev, E. A. Popov, A. F. Shestakov, Chem. Phys. 189, 367 (1994).