Sputtering of alkali metals into a gas medium upon excitation by products of nuclear reaction $^{6}Li(n,\alpha)^{3}H$

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Uranium fission fragments, as well as products of $^{3}He(n,p)^{3}H$ and $^{10}B(n,\alpha)^{7}Li$ nuclear reactions were used in the nuclear reactor for gas ionization and excitation [1, 2]. The use of a nuclear reaction with lithium-6 with thermal neutrons was studied to a less extend, before our works [3, 4]. The large mean free path of tritium nuclei in lithium (130 μm) and gaseous media (35 cm in atmospheric pressure helium) makes it possible to excite large volumes of gases and provide a larger amount of power nested in the gas in comparison with reaction products with ^{10}B. Several modification of irradiation devices with a lithium cell for reactor experiments were constructed. At studying luminescence of noble gases with excitation by nuclear reaction products: $^{6}Li + n \rightarrow {}^{4}He\ (2{,}05\ MeV) + {}^{3}H\ (2{,}73\ MeV)$, (1)
it was found, that at a temperature of the lithium layer of~500 K, lines of lithium, as well as impurities of sodium and potassium in lithium appear in the spectrum [4, 5]. The vapor density significantly exceeding density of saturated lithium vapor during ordinary thermal heating of lithium is generated by the α-particles and tritium nuclei released from the lithium layer, as well as when the opposite wall is bombarded [5]. It was noted that the population of the lithium atom levels almost has no any effect on the population of 2p-levels of a noble gas atoms. The main channel leading to the population of lithium levels, apparently, is the Penning process (R is a noble gas atom): $R(1s) + Li \rightarrow R + Li^{+}$.
Excitation of sputtered lithium atoms occurs as a result of further plasma-chemical reactions in a gas.

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