

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

Kuanysh Samarkhanov<sup>1</sup>, Mendykhan Khasenov<sup>2</sup>, Yuriy Gordienko<sup>1</sup>, Yuriy Ponkratov<sup>1</sup>,

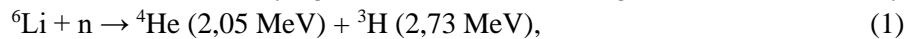
Vadim Bochkov<sup>1</sup>, Yevgeniy Tulubayev<sup>1</sup>

<sup>1</sup> *Institute of Atomic Energy Branch of the National Nuclear Center of the Republic of Kazakhstan,  
10 Beybit Atom St., 071100, Kurchatov, Kazakhstan*

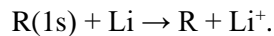
<sup>2</sup> *School of Science and Humanities, Nazarbayev University, 53 Kabanbay Batyr Ave., 010000,  
Nur-Sultan, Kazakhstan*

E-mail: samarkhanov@nnc.kz

Uranium fission fragments, as well as products of  ${}^3\text{He}(n,p){}^3\text{H}$  and  ${}^{10}\text{B}(n,\alpha){}^7\text{Li}$  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 extent, before our works [3, 4]. The large mean free path of tritium nuclei in lithium (130  $\mu\text{m}$ ) 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  ${}^{10}\text{B}$ . 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:



it was found, that at a temperature of the lithium layer of  $\sim 500$  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  $\alpha$ -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):



Excitation of sputtered lithium atoms occurs as a result of further plasma-chemical reactions in a gas.

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