# Study of Luminescene in Noble Gases and Their Binary Mixtures Excited by the Products of $^{6}$Li(n,α)T Nuclear Reaction

Kuanysh Samarkhanov[1], Erlan Batyrbekov[2], Mendykhan Khasenov[3], Nikolay Barsukov[1], Yuriy Gordienko[1], Yuriy Ponkratov[1], Timur Kulsartov[1], Zhanna Zaurbekova[1], Yevgeniy Tulubayev[1], Vadim Bochkov[1]

[1] *Branch Institute of Atomic Energy, NNC RK, 10 Krasnoarmeyskaya st., Kurchatov, 071100, Kazakhstan*
[2] *NNC RK, 2 Krasnoarmeyskaya st., Kurchatov, 071100, Kazakhstan*
[3] *National Laboratory Astana, 53 Kabanbay Batyr Ave., Astana 010000, Kazakhstan*

E-mail: *samarkhanov@nnc.kz*

Direct conversion of nuclear particles' energy into optical radiation opens up new opportunities in obtaining a large amount of light energy, including its most perfect form - coherent light [1-2]. Moreover, optical radiation study of a nuclear-excited plasma produced by products of nuclear reactions is of interest for: development of an alternative method of energy output from a nuclear reactor [3]; creation of devices to control and regulation of nuclear reactors' parameters, creation one of the diagnostics of high-temperature plasma in fusion reactors [4]. Therefore, spectral studies of nuclear-excited plasma are relevant and are of interest for solving problems, associated with gas media selection with high efficiency of nuclear reaction energy conversion into optical radiation. Currently, at the Institute of Atomic Energy of NNC RK (Kurchatov, Kazakhstan) the activities are carried out on study of spectral-luminescent characteristics of nuclear-excited plasma, induced by products of nuclear reaction to select the gas media with a high conversion coefficient of nuclear energy into optical radiation. For ionization and excitation of gas media in experiments, carried out at the IVG.1M stationary reactor the $^{6}$Li(n,α)T nuclear reaction with application of surface sources of charged particles was chosen [5]. This paper presents the results of spectral-luminescent characteristics study of unary noble gases (Ne, Ar, Kr, Xe) and binary Kr-Xe gas mixture in a 200 - 975 nm range, with ionization gaseous media by products of $^{6}$Li(n,α)T nuclear reaction under reactor irradiation.

[1] Batyrbekov E.G. Laser and Particle Beams, V. 31, issue 4, 673-687 (2013).
[2] Khasenov M.U. R. Viskup (Ed.), InTech, pp. 163-198, 2016.
[3] Mel'nikov S.P. et al. Springer, 455 (2015).
[4] Apruzzese G.M., et al. Nuclear materials and energy 12 (2017) 1214-1218.
[5] Samarkhanov K.K., et al. Proc. SPIE. 2018. Vol.10614