

LITHIUM-LOADED PLASTIC SCINTILLATORS FOR THERMAL NEUTRON DETECTION

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This work presents the results of the optimization of the composition of lithium-loaded plastic scintillators (Li-PS) based on a copolymer of styrene and methacrylic acid. The light output, transparency and luminescence spectra were measured.

The composition of the Li-PS was optimized by measuring the light yield dependence on the concentrations of the primary (PPO) and secondary (POPOP) scintillation additives, as well as the secondary solvent (naphthalene). Lithium acetate was used as a lithium-containing additive.

As a result, the samples of lithium-loaded plastic scintillators with optimal concentrations were obtained: PPO –4%, POPOP –0.02%, naphthalene –15%. The maximum concentration of lithium in the obtained samples was 0.3%.

Figure. The dependence of the light yield of scintillators based on a copolymer of styrene and methacrylic acid containing 4% PPO, 0.02% POPOP and 15% naphthalene on the concentration of lithium (relatively to the light yield of unloaded polystyrene based plastic scintillator).

The light yield of designed Li-PS practically does not depend on the metal fraction and is close to the half of the light yield of unloaded polystyrene based plastic scintillator.

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