LITHIUM-LOADED PLASTIC SCINTILLATORS

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The present investigation is devoted to obtaining and studying the properties of new lithium-loaded plastic scintillators (Li-PS) which are interesting as materials for the thermal neutron detection. Li-loaded organic scintillators have several advantages in comparison with the more using for this purpose gadolinium-loaded materials. The main advantage is that the thermal neutron capture by ^{6}Li produces ^{4}He and ^{3}H, which may be registered locally, within a few micrometers from the capture point, and unlike the use of gadolinium, gives the coordinates of the event.

Currently known lithium-loaded plastic scintillators have significant drawbacks: low transparency [1, 2–5], laborious [6] and unstable production technology [7].

Features of the properties of lithium (high polarity of the formed bonds, inability to form complex compounds, instability of organometallic compounds) sharply limit the range of its compounds for use as a lithium-loaded additives for Li-PS. However, we have developed a method for obtaining lithium-loaded PS based on copolymer of styrene and methacrylic acid. As the lithium-loaded additive one of its carboxylates was used. At the present investigation the light output and transparency of experimental samples of new materials were measured, their composition was optimized and the possibility and necessity of using naphthalene as a secondary solvent to improve scintillation characteristics were evaluated.

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