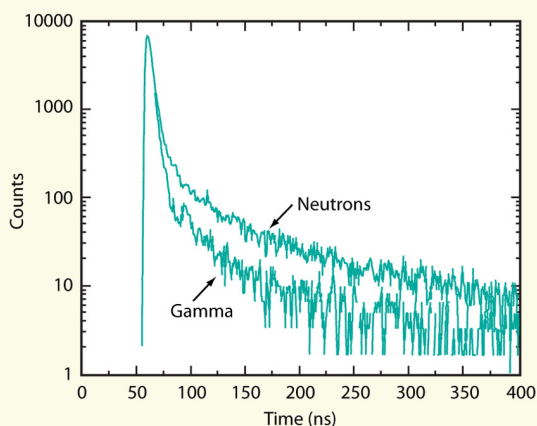


Improved Lithium-Loaded Liquid Scintillators for Neutron Detection

UT-B ID 200702015



Time distribution of light emission in lithium-6 (1.0 wt %) loaded liquid scintillator.

Technology Summary

A liquid scintillator with a substantially increased lithium weight was developed by ORNL researchers. Scintillators are widely used for the detection of neutron radiation emitted by radioactive sources.

Conventional liquid scintillators are loaded with neutron absorbers. However, these scintillators generally have lower than optimum light output and pulse shape discrimination. This invention addresses these limitations with higher lithium loads that can remain transparent in the liquid composition. These features also enable discrimination of neutron and gamma radiation.

The composition includes one or more nonpolar organic solvents, lithium-6, and one or more fluorophores. The scintillators can be used for neutron scattering-based spectroscopic techniques, homeland security detection of illicit fissile nuclear material, and medical imaging applications.

Advantages

- High light output and pulse shape discrimination combination
- Increased lithium weight percentage loaded into liquid scintillator cocktail
- Enhanced solubility of lithium salts

Potential Applications

- Gamma, X-ray, and neutron radiation detection
- Low energy emission detection
- Neutron scattering spectroscopy
- Medical imaging applications, such as positron emission tomography
- Clinical research and analysis of pharmaceuticals

Patent

Sheng Dai, Banu Kesanli, and John S. Neal, *Lithium Loaded Liquid Scintillators with Pulse Shape Discrimination Characteristics for Neutron Detection*, U.S. Patent Application 12/605,408, filed October 26, 2009.

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