

LITHIUM BASED SCINTILLATORS FOR NEUTRON DETECTION

ABSTRACT

A neutron scintillator composite (NSC) is made of a neutron scintillator and a binder. The neutron scintillator of the composite has the formula $\text{Li}_y\text{MgBr}_{y+2}$, where $y = 2, 4$ or 6 and may further comprise cerium as a scintillation activator. The binder of the composite has an index of refraction substantially identical to that of the neutron scintillator. The neutron scintillator and binder are mixed into a solid or semi-solid neutron scintillator composite having sufficient flowability for molding into a shaped article, such as a neutron sensing element of a radiation detector. The neutron scintillator composite collects and channels photons through the material itself and into a photosensing element optically coupled to the composite. Because the indices of refraction for both the neutron scintillator and the binder are substantially identical, scattering at the scintillator-binder interface(s) is minimized, thereby producing transmission efficiencies that approach single crystals.

Figure 1