Gamma-Neutron Scintillator Properties

- Dual Mode Detection
- Room Temperature Operation
- Single Scintillation Material

2.0” x 2.0” CLLBC Scintillator
The new scintillator $\text{Cs}_2\text{LiLa(Br,Cl)}_6\text{Ce}$ (CLLBC) is a practical gamma-neutron detector for use as a replacement for both high energy resolution gamma-ray detectors and high pressure Helium-3 tubes for neutron detection. The ease of using pulse height as well as pulse shape discrimination for neutron detection, combined with gamma-ray energy resolution better than $\text{NaI:Tl}$ or $\text{CsI:Tl}$ and in the working range of $\text{LaBr}_3\text{Ce}$, make the CLLBC detector an ideal solution for several classes of handheld instruments, including spectroscopic personal radiation detectors (SPRDS) and radionuclide identification devices (RIDs). Other applications requiring gamma-neutron detection can also benefit from using CLLBC.

Instrument manufacturers will also find the simplicity and compactness of implementing a dual-mode detector to be advantageous. The neutron cross-section of 95% $^{6}\text{Li}$-enriched CLLBC is 2.5 times that of $^3\text{He}$ (10 atmospheres), compared on a volume basis. Due to its highly proportional response, energy resolution for 662 keV gamma rays is typically better than 3.5% using CLLBC (a factor of two improvement over NaI:Tl), depending on the configuration of the detector and photosensor. CLLBC can be packaged with a temperature sensor and a SiPM array. The resulting CLLBC-SiPM sensor offers a compact package, low voltage requirements, and a reliable signal for neutron detection and gamma-ray spectroscopy.