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Studies of single crystal organic scintillators for neutron detection¹ ANDREW GLENN, NATALIA ZAITSEVA, LESLIE CARMAN, STEPHEN PAYNE, MICHELLE FAUST, NERINE CHEREPY, SEBASTIEN HAMEL, Lawrence Livermore National Laboratory, JASON NEWBY, Oak Ridge National Laboratory — Organic crystal scintillators have long been used for fission energy neutron detection and identification. The gamma/neutron separation techniques, known collectively as pulse shape discrimination (PSD), are based on the relative increase in delayed florescence for neutron excitations in comparison to that of gammas. We have conducted a broad survey of the PSD properties for over one hundred single crystal scintillators produced from solution growth techniques, including Li compounds which have sensitivity to lower energy neutrons via neutron capture on ${}^{6}Li$. Crystal growth methods utilizing temperature reduction of supersaturated solutions have allowed us to produce large volume $(> 100 \text{ cm}^3)$ faceted organic crystal scintillators with neutron/gamma PSD comparable or superior to trans-stilbene for a subset of these materials. These results show good progress in overcoming the scalability issues of crystal scintillators for neutron detection. We present a survey of our recent results including mixed crystals of varying stilbene fraction.

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