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Investigation of PVT Scintillators for Fast Neutron Imaging

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Three Polyvinyltoluene (PVT) scintillators, provided by Lawrence Livermore National Laboratory (LLNL), with different dimensions and doped with 2% Flrpic (an Iridium complex flour) have been characterized in terms of spatial resolution and relative light output using the North Radiography Station (NRS) beamline of Neutron Radiography (NRAD) Reactor at the Idaho National Laboratory (INL). The beamline provides above 1-MeV fast neutrons with a flux higher than 1.5 x 1e7 n/cm2s. The mechanism that causes energy deposition, and eventually scintillation, in PVT material, is the recoil of a proton from n-p elastic scattering. In this study, radiography and tomography images of a phantom made of HDPE and structures containing various neutron absorbing and scattering materials such as paraffin wax, Aluminum, cement, and stainless steel were also acquired. All images were obtained using a camera-based system along with a rotating stage for obtaining different projections of the phantom. This study focused on evaluating of PVT scintillators for fast neutron imaging applications.

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