# Thermal Neutron Detection with Boron-Loaded Polysiloxane Organic Scintillators

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## Abstract:

Polysiloxane organic scintillators have been shown to have high light output and efficient pulse shape discrimination capabilities with a lower primary dopant loading than traditional polyvinyltoluene (PVT) scintillators. In this study, polysiloxane scintillators were loaded with boron to measure thermal neutrons via B-10 capture. The scintillator response to thermal neutrons was measured as well as their light output and pulse shape discrimination of fast neutrons, gammas, and thermal neutrons. The three boron-10 enriched molecules tested were phenylpinacolborane (PPB), tolylphenylpinacolborane, and trifluorophenylpinacolborane. These molecules were loaded into scintillators with either 9,9-dimethyl-2-phenyl-9H-fluorene (PHF) or 2,5-diphenyloxazole (PPO) primary fluorophores in a Shin-Etsu KER6000 or a Wacker SILRES H62C matrix and each with 9,9-dimethyl-2,7-distyryl-9H-fluorene (SFS) as the secondary dopant. All matrices tested are curable in 3 hours or are modified to be cured in 3 hrs at 150°C in air.