Tailoring Polysiloxane Matrices in Plastic Scintillators for Efficient Light Output and Pulse Shape Discrimination

Caleb Chandler  
Colorado School of Mines  
chandler@mymail.mines.edu  
Advisor: Alan Sellinger

Jonathan Arrue  
Georgia Institute of Technology  
jarrue3@gatech.edu  
Advisor: Anna Erickson

Abstract:
Plastics have found use as scintillators due to their relative ease of fabrication and ability to distinguish gamma and neutron response through pulse shape discrimination. A renewed interest in applying polysiloxanes as a matrix material in these scintillators has recently shown that competitive pulse shape discrimination (PSD) and light yield can be achieved using lower dopant loadings (5 wt% or less) in commercially available polysiloxanes (versus > 20wt% in polyvinyltoluene).¹ Current efforts have been directed towards synthesizing siloxanes tailored specifically for radiation detection. Through a collaborative cycle of design, synthesis and measurement, advancements have been made towards identifying and optimizing phenyl content in polysiloxane scintillators for efficient light output and PSD.