

# **Pyrolysis Oil Substituted Epoxy Resin: Improved Ratio Optimization and Crosslinking Efficiency**

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## **ORAL PRESENTATION**

### **Feedstock Conversion**

#### **Abstract**

The objective of this study was to determine the compatibility of whole pyrolysis oil of pine as a substitute for the phenolic component of epoxy resins. Pyrolysis oil-based epoxy resin (POBER) was synthesized by modification of EPON828 epoxy resin with pyrolysis oil at various mixing ratios (1:3 – 1:8, pyrolysis oil:EPON828, w/w). Acetone extraction determined that a ratio of 1:7 – 1:8 resulted in a fully reacted thermoset, leaving neither pyrolysis oil nor EPON828 in a significantly unreacted state. DMA analysis revealed that a ratio of 1:8 produced the highest storage modulus ( $E'$ ); in addition, it was determined that this ratio provided a superior glass transition temperature of 120 °C and crosslinking density of 1891 mol/m<sup>3</sup>. FTIR spectra concluded that the reaction between the EPON828 and pyrolysis oil was complete at the 1:8 ratio, citing the removal of hydroxyl and epoxide peaks within the cured product.