

## **Self-healing efficiency study of thermoset-thermoplastic polymer material**

### **ABSTRACT**

This study is focused on exploring intrinsic self-healing polymer material development, where the inclusion of thermoplastic additives into thermoset polymer material as healing agents. Intrinsic self-healing thermoset-thermoplastic development is involving the material formulation of thermoset liquid resin (Poly Bisphenol A-co-epichlorohydrin) and thermoplastic (polycaprolactone). The material formulation ratio is up to 30% polycaprolactone with respect to thermoset weight. The mixture is heated and stirred to saturate at 80°C before the hardener is added. The mixture is cured and further finishing as Charpy impact test specimen. The specimen is fractured and absorbed impact energy property characterised through the Charpy impact test. The heat treatment is then performed to trigger the self-healing reaction in the polymer. The self-healing efficiency of the thermoset thermoplastic is investigated based on the absorbed impact energy before and after the heat treatment. The 20% or higher thermoplastic concentration in the polymer caused the polymer to possess high self-healing efficiency and faster healing time as compared to the low thermoplastic concentration polymer. However, the high concentration polymer has a disadvantage on the overall structural strength instead. On the contrary, 10% to 15% thermoplastic composition will result in lower and slower self-healing performance but higher initial structural strength.