**THE EFFECT OF GLYCEROL IN THE SYNTHESIS OF A LACTIC ACID BASED THERMOSET RESIN**

**Fatimat .O. Bakare1\*, Dan Åkesson**1**, Mikael Skrifvars**1**, Yanfei Wang**2**, Nima Esmaeili**1**, Shahrzad Javanshir Afshar**1

1School of Engineering, University of Boras

2University of South China, China

**ABSTRACT**

Resin production from bio-based materials has been of paramount interest in order to decrease the use of fossil resources. A bio-based thermoset resin has been synthesized using lactic acid oligomers of three different chain lengths: n=3, 7 and 10. Lactic acid was made to react with glycerol by direct condensation and was end-functionalized with methacrylic anhydride. The resins were characterized using FTIR, 13C-NMR spectroscopy, DSC and DMTA to confirm the resin structure and degree of crosslinking. The viscosities were also measured in order to be used as a matrix in composite applications. The results showed that the glass transition temperature of resin with the chain length n=3 at 98°C is comparable with the glass transition temperature for commercial unsaturated polyester resins. The FTIR, 13C-NMR spectroscopy, DSC and DMTA characterization also showed that the resin with n=3 can be used as bio-based resin due to its higher degree of crosslinking compared to the resins with n=7 and 10.

Keywords: synthesis; thermosets; crosslinking; renewable resources; lactic acid