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Fibre-reinforced thermoplastics : processing using reactive solvents

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Fibre-Reinforced Thermoplastics
-Processing Using Reactive Solvents-

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Introduction

The impregnation of continuous-fibre reinforcements with highly viscous melts of thermoplastic resins requires special technologies [1]. The objective of our research is to investigate a new impregnation route [2] based on the use of reactive solvents or monomers, such as epoxy resins, see Figure 1.

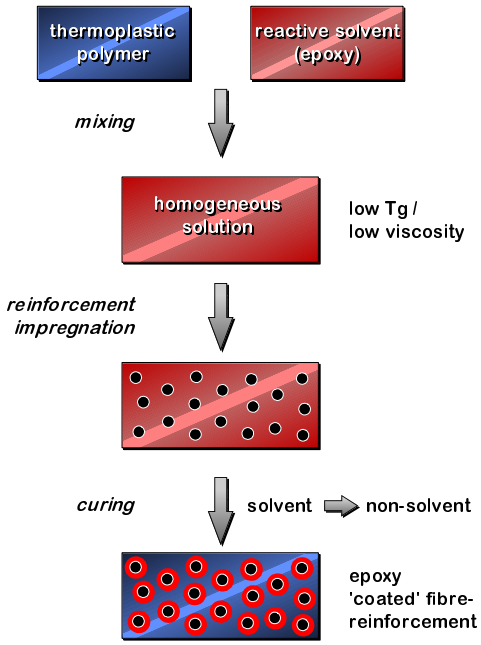

Figure 1 *Impregnation route using reactive solvents.*

The advantages over the conventional impregnation techniques are:

- Reduced viscosity or processing temperature during impregnation.
- Reactive solvent is structural part of material after in-situ cure.
- Tailoring of fibre-matrix adhesion by solvent choice.

Influence of Fibre Surface Tension

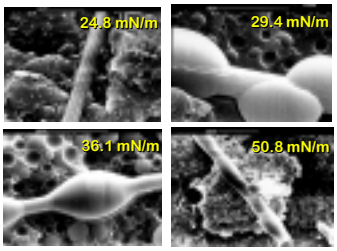

Figure 2 *Morphology of PS-Epoxy based composites showing increased fibre wettinig by epoxy with increasing fibre surface tension [3].*

Influence of Epoxy on Fibre-Matrix Adhesion

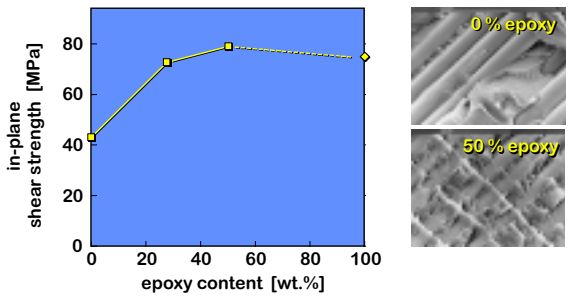

Figure 3 *PET-Epoxy based glass-fibre laminate shear strength and fracture surface, showing increased adhesion with addition of epoxy [4].*

Conclusion

Using reactive solvents in thermoplastic composite manufacture can extend the processing limits and creates the potential to tailor the ultimate composite properties.

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[4] SAALBRINK A., MUREAU M., PEIJS T., *Proc. ICCM-11* (1997), **IV.**