Electronic Supporting Information

Miscibility, Thermal degradation and Rheological analysis of epoxy/MABS blends

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MATERIALS

Methyl methacrylate acrylonitrile butadiene styrene (MABS) with a trade name Terluxs2802 TR was used as the thermoplastic toughener for epoxy system. MABS is an engineering thermoplastic. It is an amorphous material, which possesses good chemical resistance and excellent impact resistance. It is a copolymer of methyl methacrylate, acrylonitrile, butadiene, and styrene.

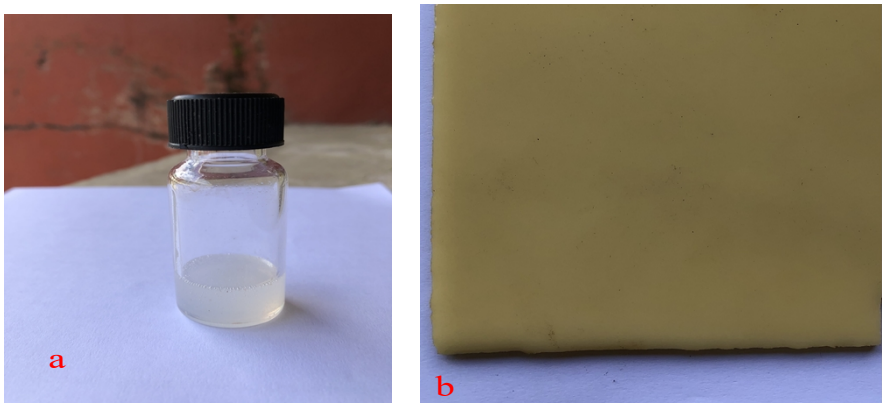

Figure S1. MABS 10 blend (a) Before and (b) after the addition of curing agent

Tensile properties. Tensile tests were conducted according to ASTM D638 at room temperature with a Tinius Olsen H50KT testing machine for the specimens with dimensions conforming to type I of this standard method. The crosshead speed used was 10 mm min_1 and the gauge length was 60 mm. Average values were obtained from at least five successful determinations

Dynamic mechanical analysis. The viscoelastic properties of MABS, neat epoxy and epoxy blends were measured using a dynamic mechanical thermal analyzer (DMTA). Rectangular specimens of 50X10X3 mm3 were used for the analysis. The analysis was done in three point bending mode at a frequency of 1 Hz and oscillation amplitude of 0.05 mm using a PerkinElmer DMA8000 instrument. The samples were scanned from 30 to 250 ^{o}C at a heating rate of 2 ^{o}C min$_{-}$1.

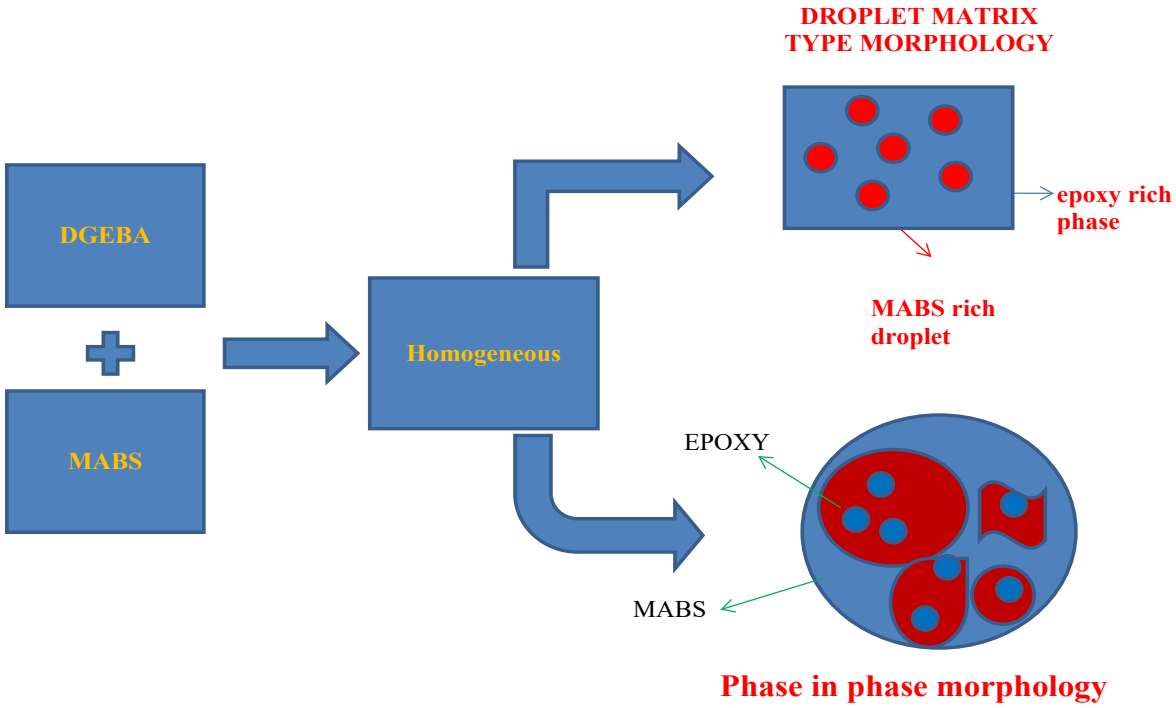

Figure S2: Schematic diagram of the developed morphology of epoxy/MABS blends

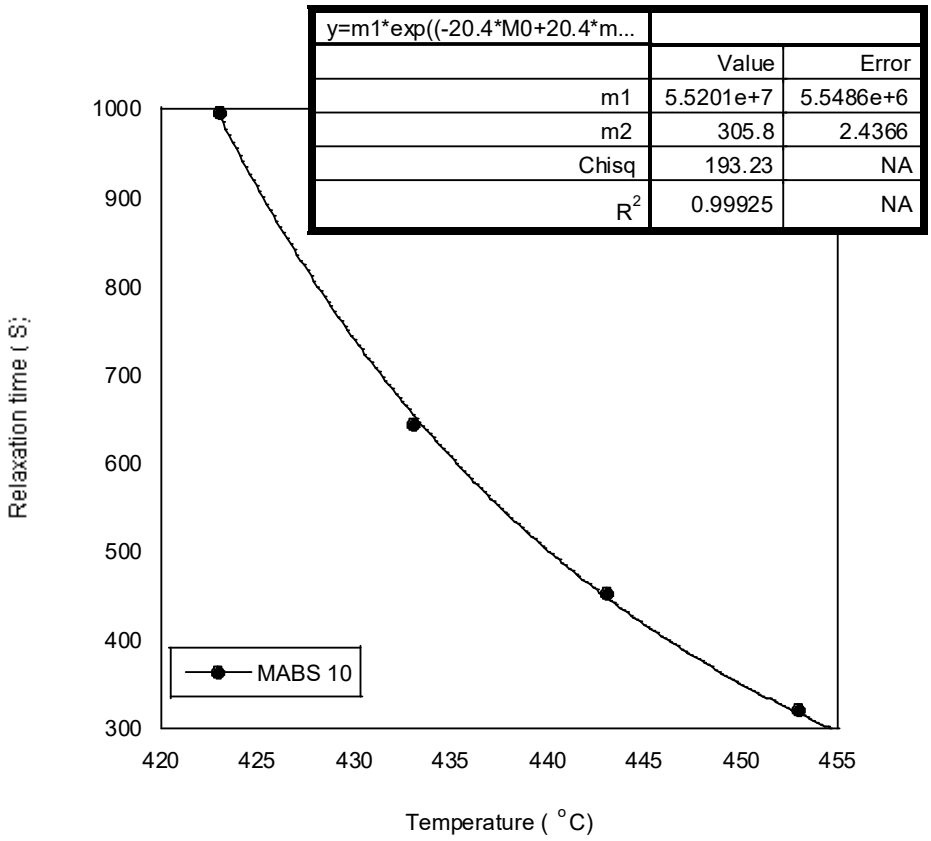

Figure S3: *Plots of the relaxation time versus temperature of MABS 10 blend*

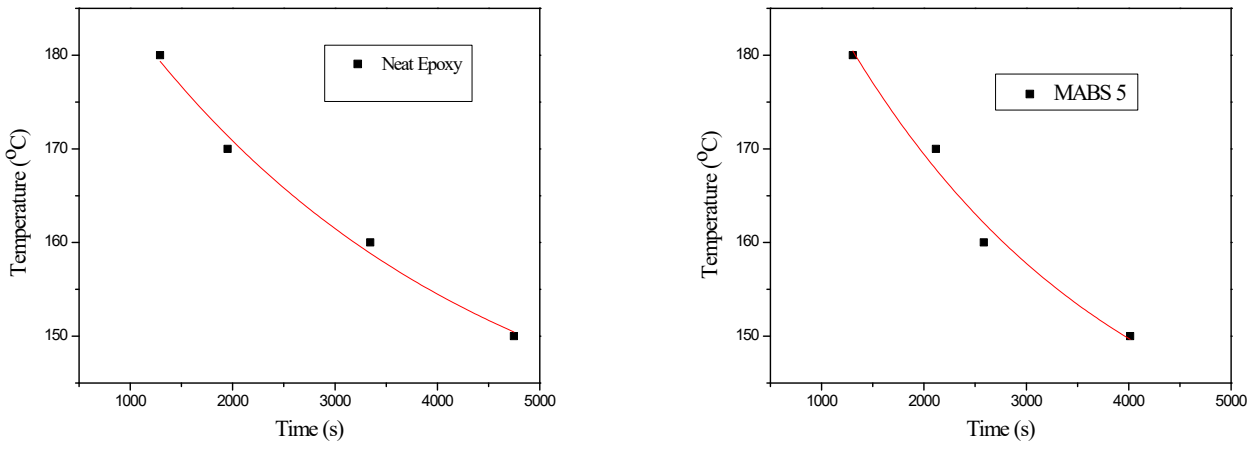

Figure S4: TTT diagram of neat epoxy and MABS 5 blend using gelation time

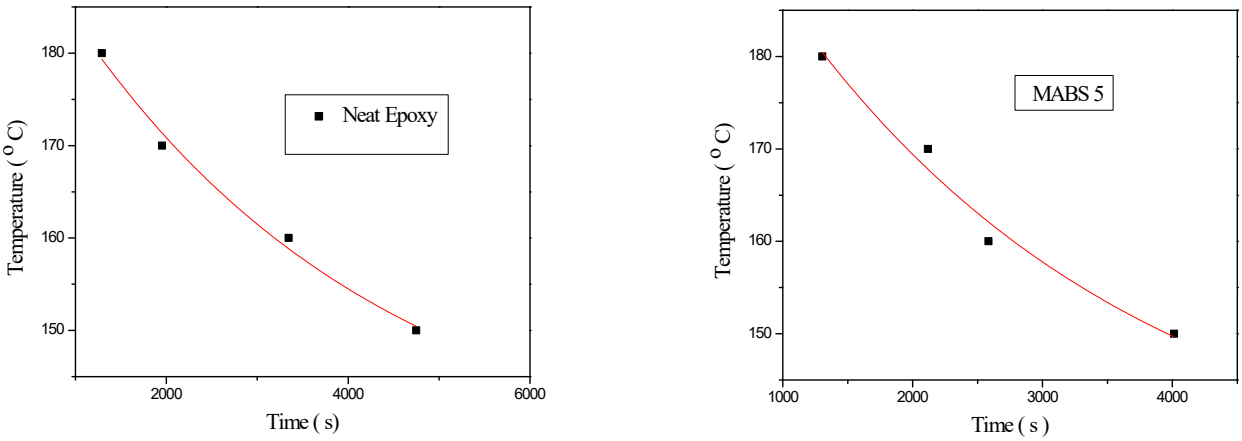

Figure S5: TTT diagram of neat epoxy and MABS 5 blend using vitrification time

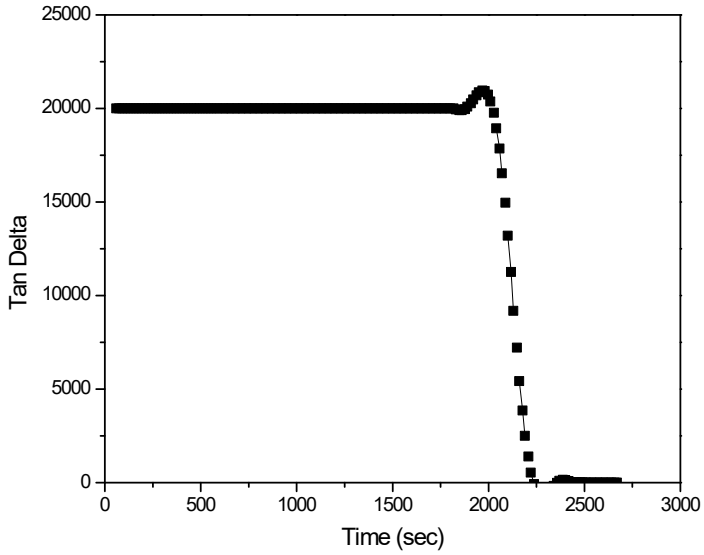

Figure S6: Variation of tan delta as a function of time of Neat epoxy

Toughness of neat epoxy and epoxy/MABS blends was calculated from stress- strain curve. MABS 10 blends exhibit maximum toughness when compared to neat epoxy and all other composition. In our previous report, we found that the mechanical properties of epoxy system can be enhanced by the incorporation of MABS into the epoxy system.

Table S1: Toughness values calculated from the area under the stress-strain graphs

Composition	**Toughness (J/m^3)**
Neat Epoxy	60
MABS 5	116
MABS 10	186
MABS 15	44
MABS 20	34

Table S2: Glass transition temperature of neat epoxy and epoxy/MABS blends from DMA analysis

MABS content	Tg (MABS phase)	Tg (Epoxy phase)
0		202.3
5	99.3	206.8
10	99.5	205.3
15	98.4	205.3
20	98.4	205.3

References

1. For the data sheet of Terluxs 2802 TR (MABS), see https:// www.uniboxinfo.com/datasheets/terlux.pdf.

2. McKeen, Laurence W. *Fatigue and tribological properties of plastics and elastomers*. William Andrew, 2016

3. J. Joy, K. Winkler, K. Joseph, S. Anas and S. Thomas, *New J. Chem.*, 2019, **43**, 9216–9225.