Electronic Supplementary Material (ESI) for RSC Advances.

Novel benzimidazole-mediated phthalonitrile/Epoxy binary blends system with synergistic curing behavior and outstanding thermal properties

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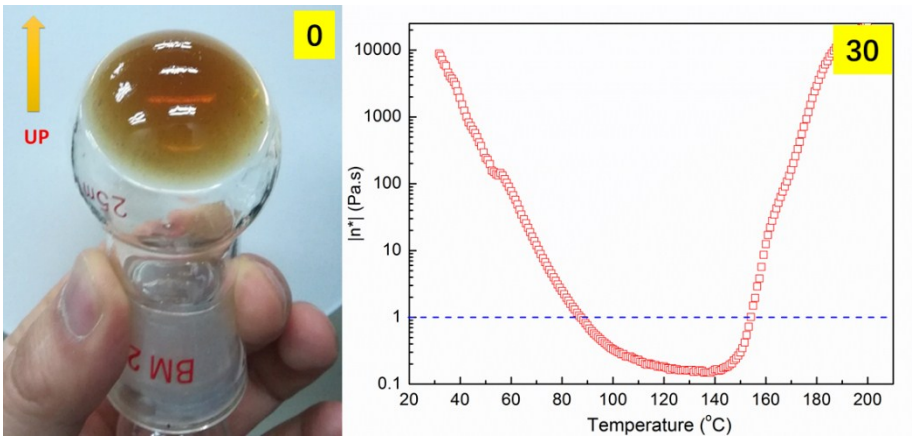

Fig. S1 (0) The photo of PE28 blend cooled at room temperature and (30) the rheological curves of PE28 blend which have been stored at room temperature for 30 days.

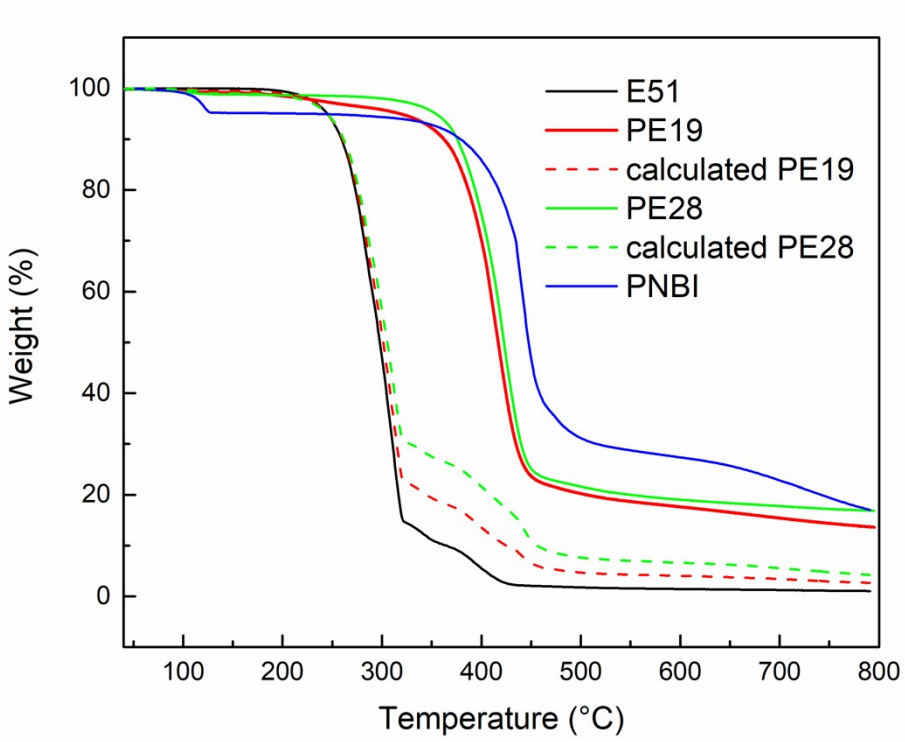

Figure S2 The TGA curves of PNBI, E51, PE19, PE28 and calculated TGA curves of PE19 and PE28 (dash lines).

NOTE: To the best of our knowledge, if two compounds have no interactions with each other, the char yields of blends of these two compounds equals to the addition of char yields of the respective components, which can be conclude by the following equation:

$$CR_{a+b} = CR_a * a\% + CR_b * b\% \qquad (1)$$

Where CR_{a+b} is the total char yield of the blend of a and b, CRa is the char yield of the pure a compound. CR_b is the char yield of the pure b compound. If two compounds have interactions with each other, the char yields of blends of these two compounds may be higher than the addition of char yields of the respective components. The comparison figure of calculated curves of PE blends regardless of the reaction of the two components and test results are listed as follows:

As showed in Figure S2, the calculated TGA curves of PE19 and PE28 (dash

lines) using Eq. (1) are much lower than the test results of PE 19 and PE28. This phenomenon indicates that some interactions are taking place which hinder the evaporation or decomposition of the blends. Considering the ordinary physical interactions are not stable at high temperatures (≥ 500 °C), we believe that this phenomenon is induced by the reaction of the blends namely PNBI promoted the curing reaction of E51 and formed the polymer.

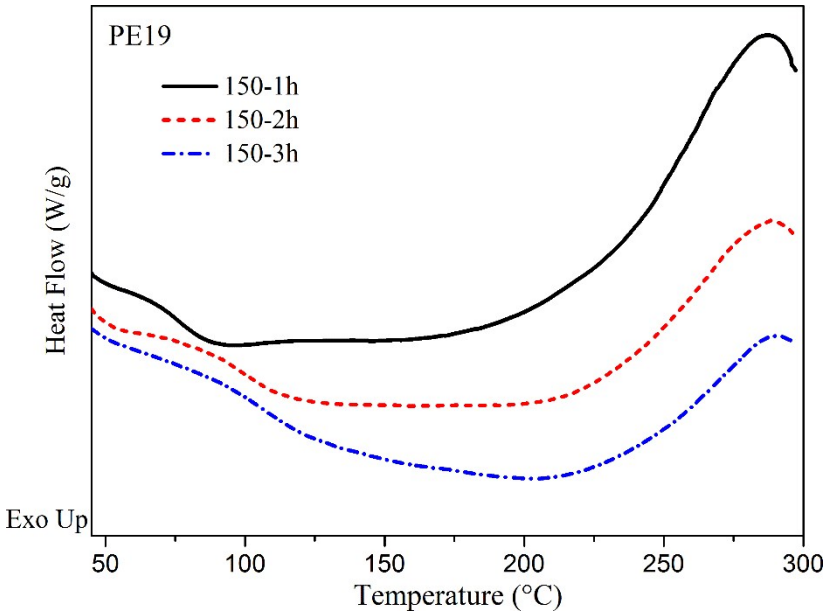

Fig. S3 The DSC curves of PE19 cured at 150 °C (pre-curing procedure before cured at 150 °C: 100°C/30min &130 °C/2h).

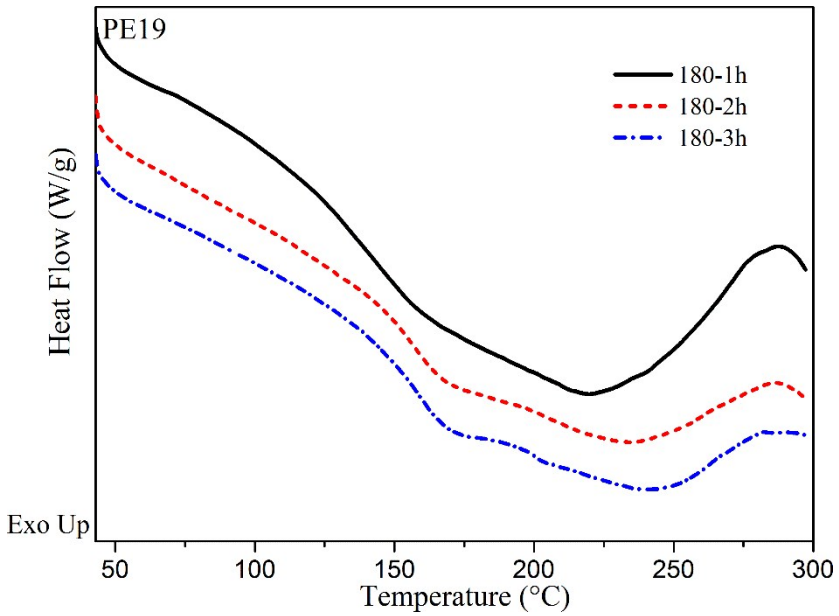

Fig. S4 The DSC curves of PE19 cured at 180 °C (pre-curing procedure before cured at 150 °C: 100°C/30min &130 °C/2h& 150 °C/2h).

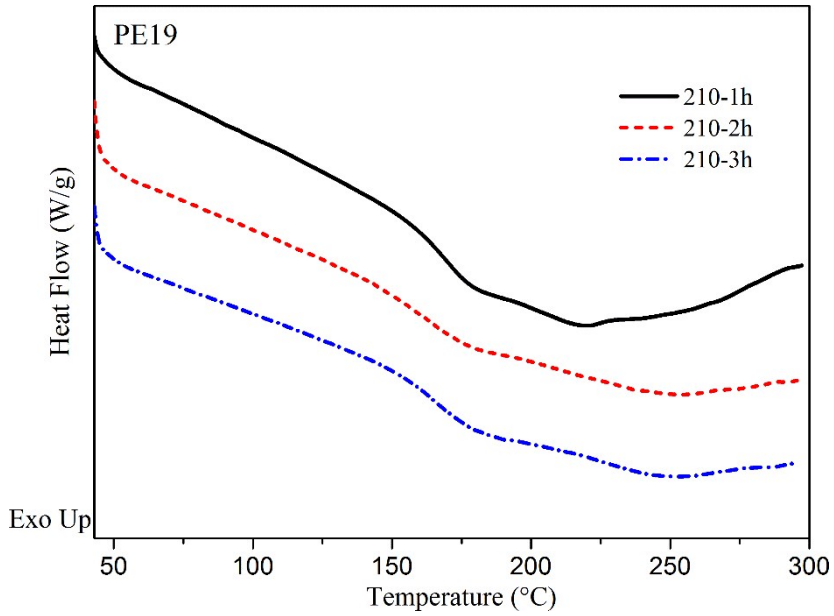

Fig. S5 The DSC curves of PE19 cured at 210 °C (pre-curing procedure before cured at 150 °C: 100°C/30min &130 °C/2h& 150 °C/2h& 180 °C/2h).

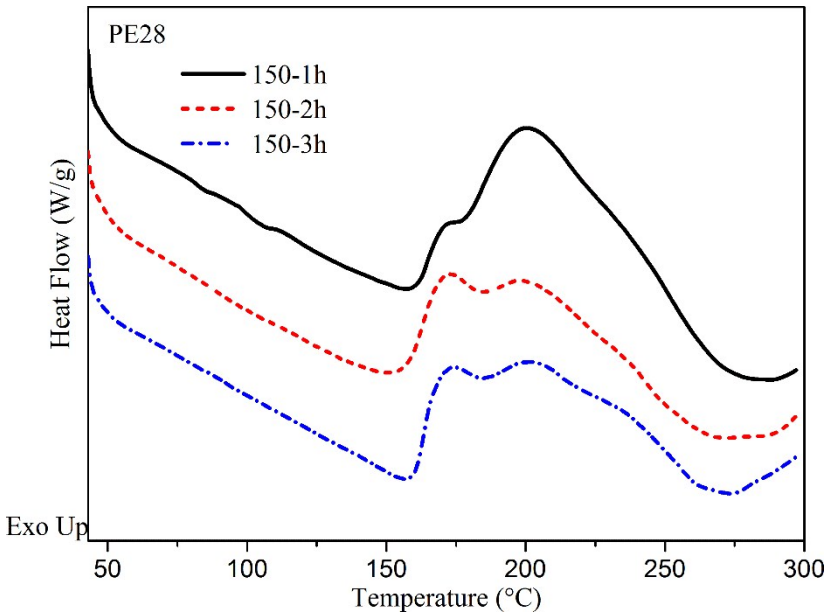

Fig. S6 The DSC curves of PE28 cured at 150 °C (pre-curing procedure before cured at 150 °C: 100°C/30min &130 °C/2h).

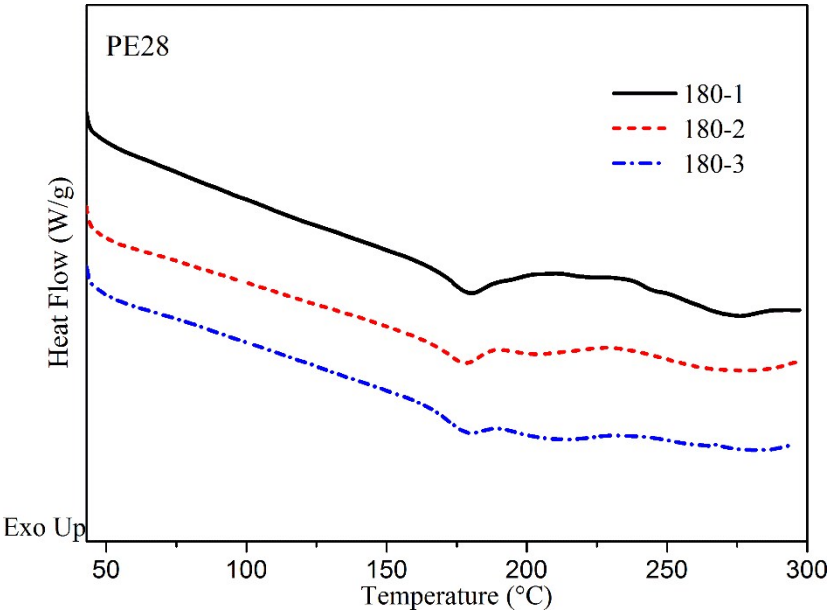

Fig. S7 The DSC curves of PE28 cured at 180 °C (pre-curing procedure before cured at 150 °C: 100°C/30min &130 °C/2h& 150 °C/2h).

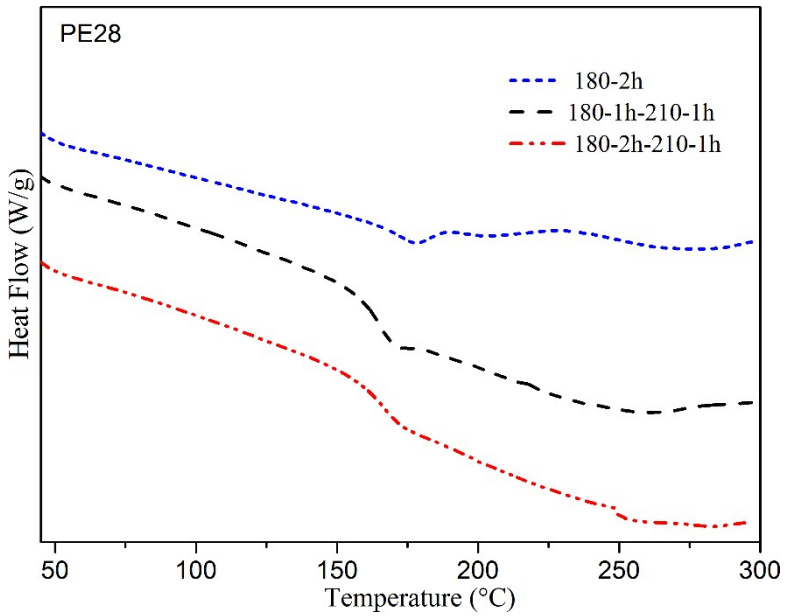

Fig. S8 The DSC curves of PE19 cured at 210 °C (pre-curing procedure before cured at 150 °C: 100°C/30min &130 °C/2h& 150 °C/2h). (Exo Up)

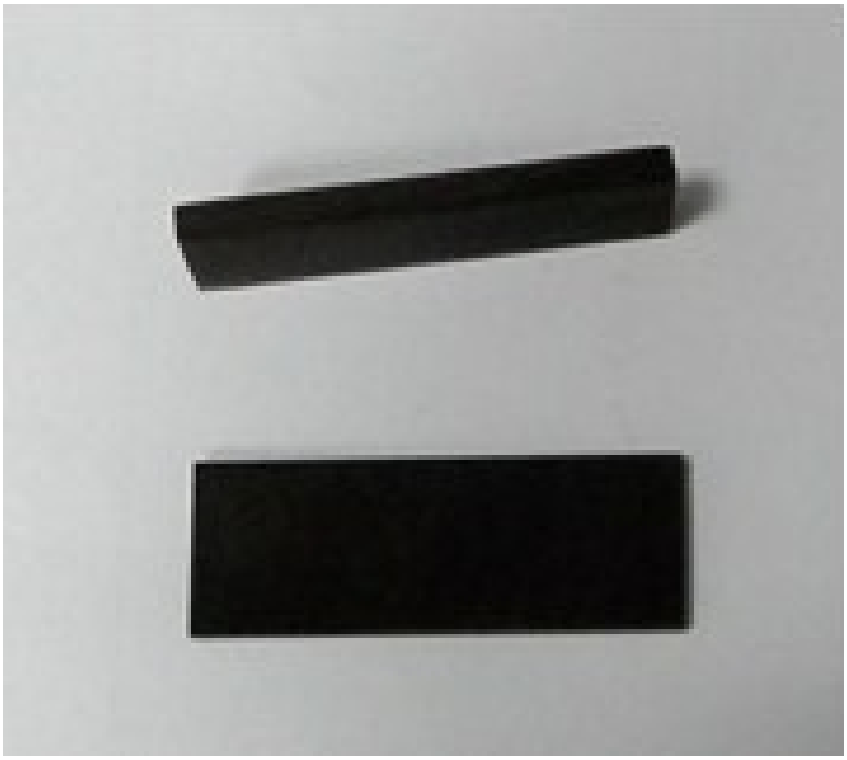

Fig. S9 The photos of cured PE blends