

Electronic Supplementary Material

Self-extinguishing and transparent epoxy resin modified by a phosphine oxide-containing bio-based derivative

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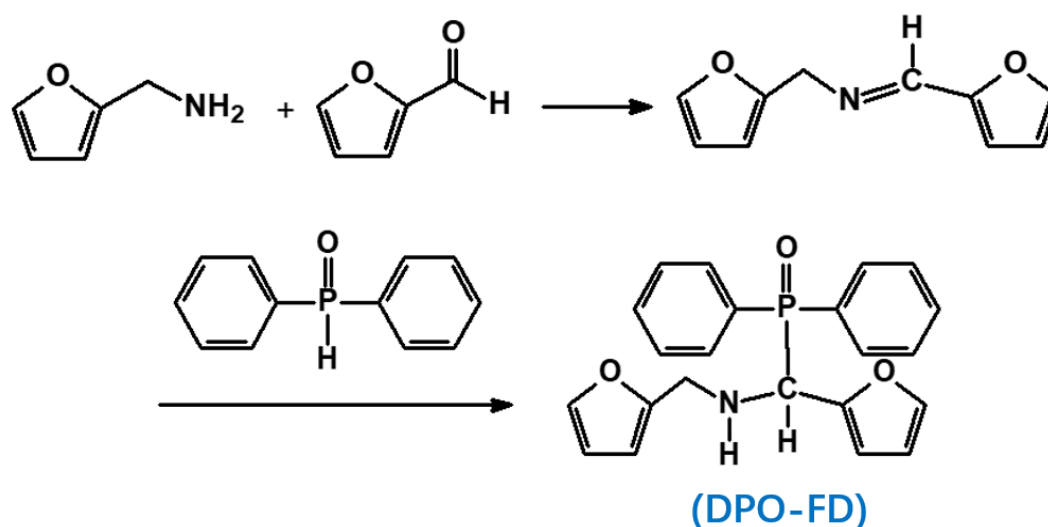


Fig. S1. Synthetic route of DPO-FD

The FTIR spectrum of DPO-FD is presented in Fig. S2. The characteristic band at 3317 cm⁻¹ is ascribed to the stretching vibration of N-H. The bands at about 3106 and 3048 cm⁻¹ are assignable to the stretching vibration of C-H in furan and benzene rings, while those at 2898 and 2825 cm⁻¹ are allocated to the stretching vibration of aliphatic

C-H. The characteristic bands at 1605 and 1501 cm^{-1} are attributable to the skeleton vibration of benzene ring, and those at 1081 and 738 cm^{-1} are owing to the existence of furan ring [1]. Moreover, the strong band at 1178 cm^{-1} is ascribed to the stretching absorption of P=O group [2]. In addition, the absence of the characteristic band at 2367 cm^{-1} which is assignable to P-H in DPO [3] implies that DPO has reacted completely with furfural to yield the target product.

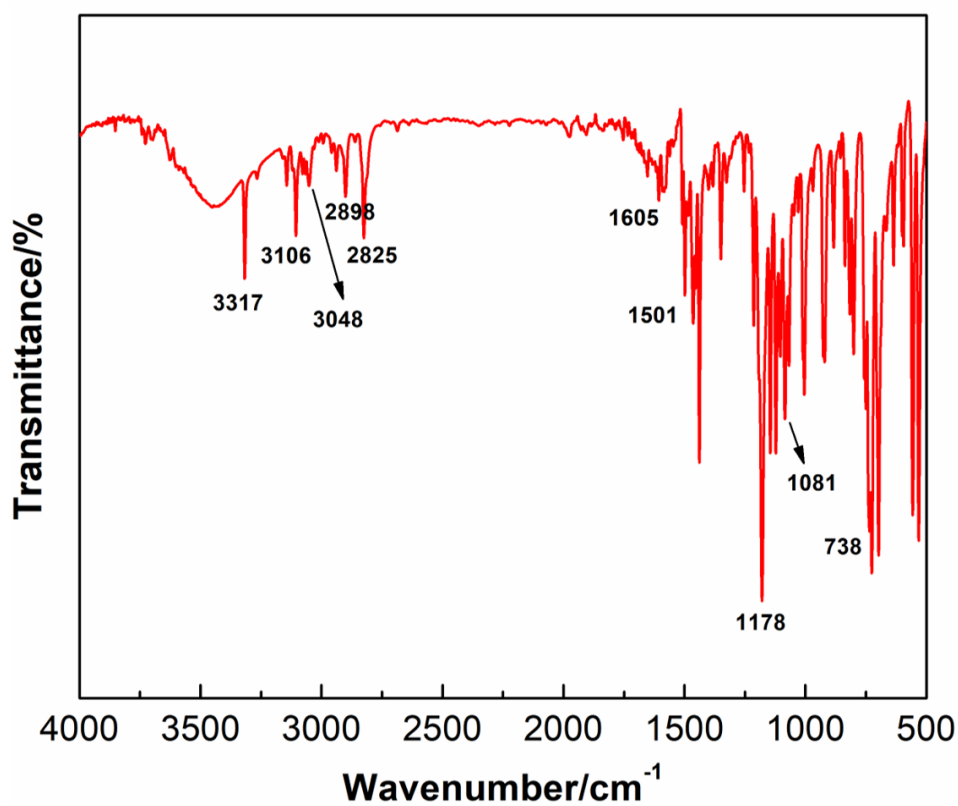


Fig. S2. FTIR spectrum of DPO-FD.

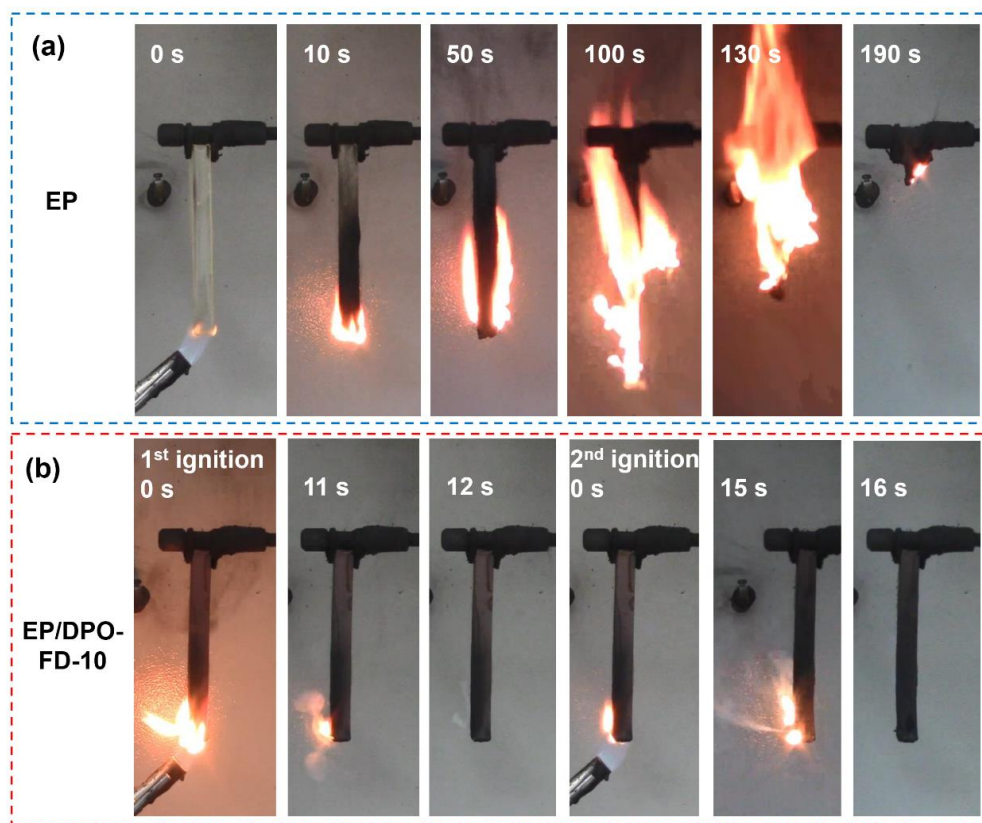


Fig. S3. Photos illustrating the UL-94 vertical burning test of EP (a) and EP/DPO-FD-10 (b).

References

1. Zhang K, Han MC, Liu YQ, Froimowicz P. Design and synthesis of bio-Based high-performance trioxazine benzoxazine resin via natural renewable resources. *ACS Sustainable Chemistry & Engineering*, 2019, 7:9399-9407.
2. Çakmakçı E. Allylamino diphenylphosphine oxide and poss containing flame retardant photocured hybrid coatings. *Progress in Organic Coatings*, 2017, 105:37-47
3. Tian X, Yin Q, Wang Z. Synthesis of diphenylphosphine oxide derivative and its flame retardant application in epoxy resin. *Journal of Photopolymer Science and Technology*, 2020, 32:769-778