

Impact of halogen-free flame retardant with varied phosphorus's chemical surrounding on the properties of diglycidyl ether of bisphenol-A type epoxy resin: synthesis, fire behaviour, flame-retardant mechanism and mechanical properties

Xiaomin Zhao^a, Heeralal Vignesh Babu^a, Javier Llorca^{a,b}, De-Yi Wang^{*a}

^a IMDEA Materials Institute, C/Eric Kandel, 2, 28906 Getafe, Madrid, Spain

^b Department of Materials Science, Polytechnic University of Madrid, 28040 - Madrid, Spain

*Corresponding author

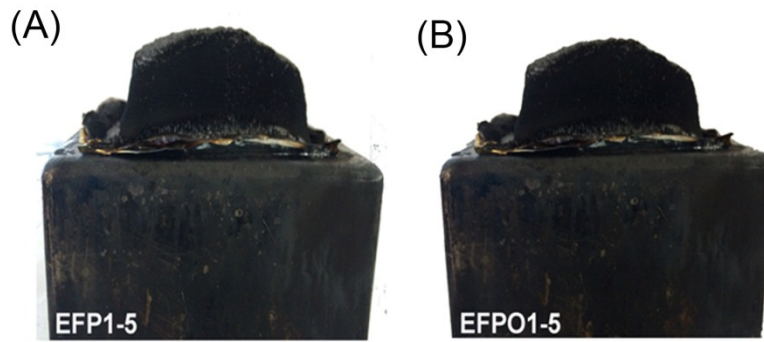
E-mail: deyi.wang@imdea.org Phone: +34 91 787 1888. Fax: + 34 91 550 3047

Supplementary information

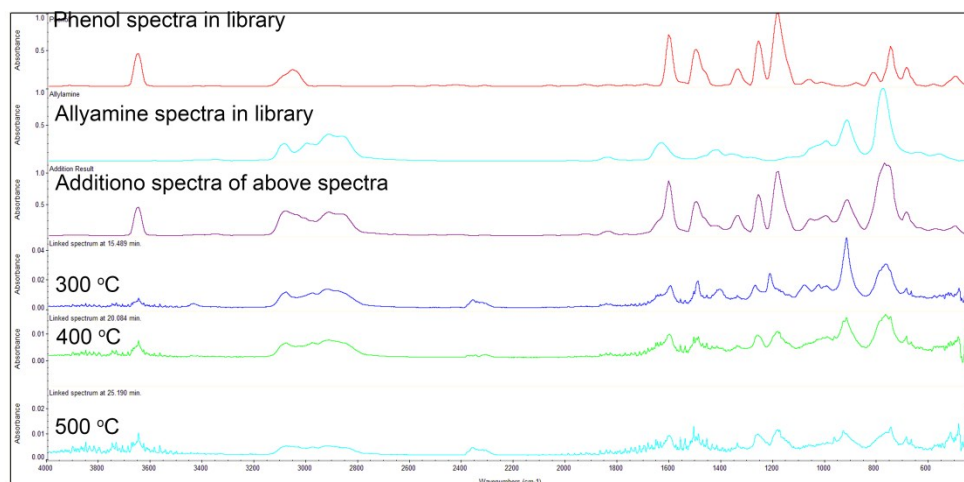
S-Tab. 1 Data from thermogravimetric curves of EP, EFP1-5 and EFPO1-5

Sample	T _{d5%} ^a (°C)	T _{max} ^b (°C)	Residue (650 °C, %)	ΔResidue ^c (650 °C, %)
EP	394	422	15.1	--
EFP1-5	339	372	27.8	12.7
EFPO1-5	308	367	33.4	18.3

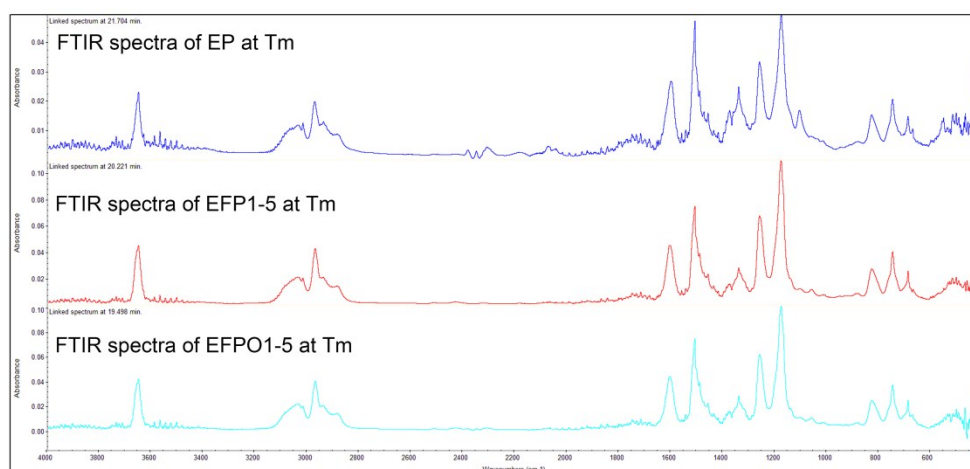
a: the temperature at 5 % weight loss; b: the temperature at maximum decomposition rate; c: the difference in residue at 650 °C with EP



S-Fig. 1 Images of char residues of EFP1-5 (A) and EFPO1-5 (B) after CONE test



S-Fig. 2 FTIR spectra of phenol, allyamine, addition of these two spectra and evolved gaseous products of FPO1 at different temperatures



S-Fig. 3 FTIR spectra of EP, EFP1-5 and EFPO1-5 at T_m