Supplementary Material

A novel benzoxazine/cyanate ester blend with sea-island phase structures

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Characterization of P-BOZ

Melting point: 128 °C; IR (KBr): 941 cm^{-1} (s, oxazine ring).

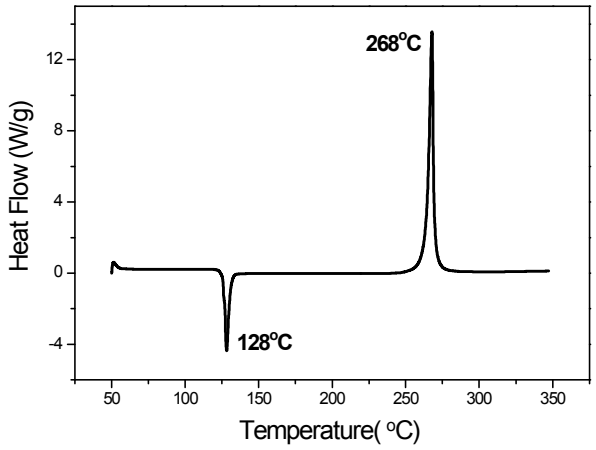

Fig. 1. DSC curve of P-BOZ.

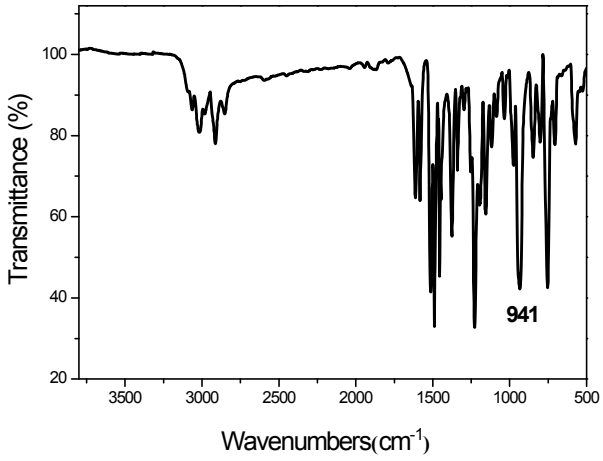

Fig. 2. FT-IR spectrum of P-BOZ.

Characterization of C-BOZ

Melting point: 95 °C; IR (KBr): 2921 cm^{-1}, 2851cm^{-1} (vs, ν_s(-CH_2)), 960 cm^{-1} (s, oxazine ring).

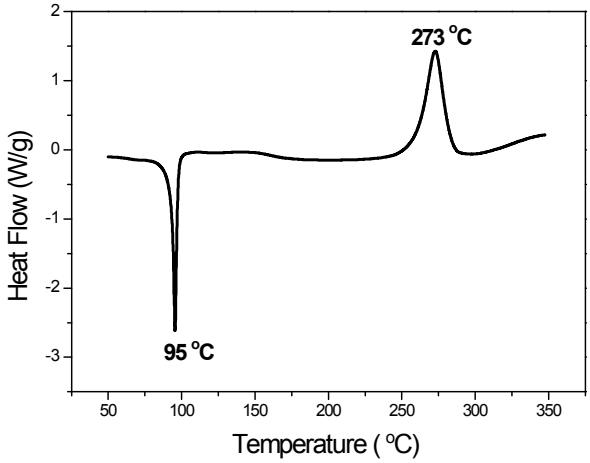

Fig. 3. DSC curve of C-BOZ.

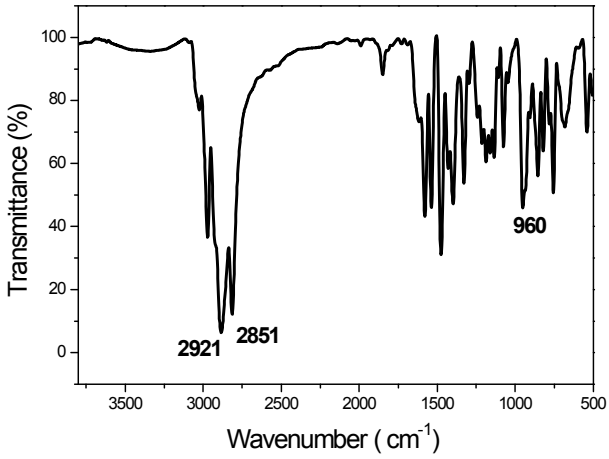

Fig. 4. FT-IR spectrum of C-BOZ.

Characterization of BADCy

Melting point: 83 ^{o}C; IR (KBr): 2227 cm^{-1}, 2275 cm^{-1} (vs, ν_s(-OCN)).

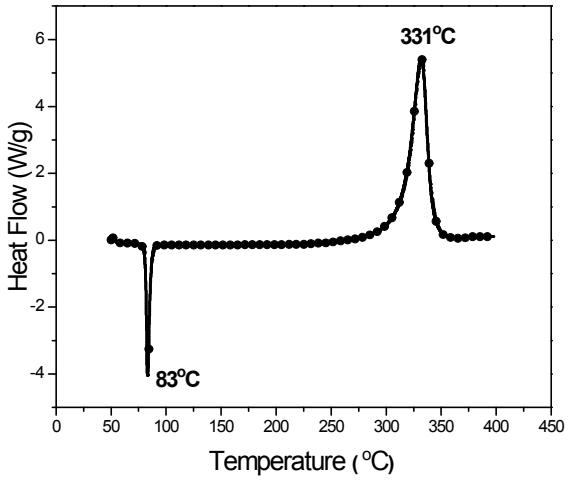

Fig. 5. DSC curve of BADCy.

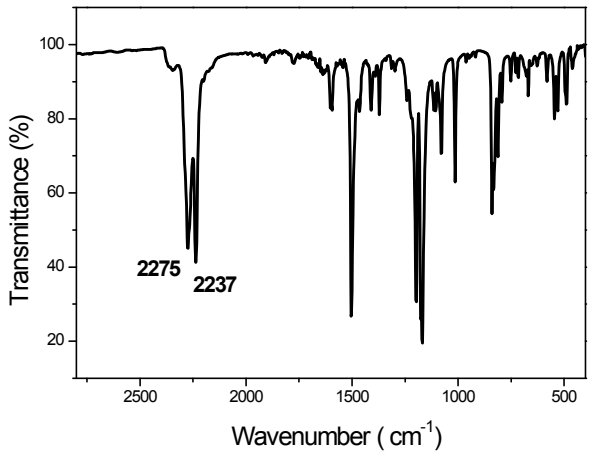

Fig. 6. FT-IR spectrum of BADCy.

Calculation of Flory-Huggins interaction parameters

Mole gravitational constants of all groups are shown in Table 1. The Flory-Huggins interaction parameters, χ, were estimated as follows.

Table 1. Molar gravitational constants of different groups.

	$-CH_3$	-CH=	-C≡N	-O-	$-CH_2-$	-C-
Molar gravitational constant $(J/M^3)^{0.5}$	301.4	434.87	725.5	235.3	269.1	65.54

ρ_{BADCy}=1.22g/cm^3 $\rho_{P\text{-}BOZ}$=1.21 g/cm^3 $\rho_{C\text{-}BOZ}$=0.95 g/cm^3

$$\delta_{BADCy}=\frac{\sum F_i}{V_R}=\frac{\rho}{M}\sum F_i=\frac{1.22}{278}\times 5309.94=23.30(J/cm^3)^{0.5}$$

$$\delta_{C\text{-}BOZ}=\frac{\sum F_i}{V_R}=\frac{\rho}{M}\sum F_i=\frac{0.95}{852.5}\times 15241.72=16.98(J/cm^3)^{0.5}$$

$$\delta_{P\text{-}BOZ}=\frac{\sum F_i}{V_R}=\frac{\rho}{M}\sum F_i=\frac{1.21}{434.5}\times 7657.7=21.33(J/cm^3)^{0.5}$$

P-BOZ/BADCy (5/5 for example):

$$V_{ref}=M_a\phi_a\Big/\rho_a+M_b\phi_b\Big/\rho_b=\frac{278}{1.22}\times 0.5+\frac{434.5}{1.21}\times 0.5=293.48cm^3$$

$$\chi_{P-BOZ/BADCy}=\frac{V_{ref}}{RT}\left(\delta_{P\text{-}BOZ}-\delta_{BADCy}\right)^2=\frac{293.48}{8.314\times 298}\times\left(21.33-23.30\right)^2=0.46$$

C-BOZ/BADCy (5/5 for example):

$$V_{ref}=M_a\phi_a\Big/\rho_a+M_b\phi_b\Big/\rho_b=\frac{278}{1.22}\times 0.5+\frac{852.5}{0.95}\times 0.5=562.62cm^3$$

$$\chi_{C-BOZ/BADCy}=\frac{V_{ref}}{RT}\left(\delta_{C\text{-}BOZ}-\delta_{BADCy}\right)^2=\frac{562.62}{8.314\times 298}\times\left(16.98-23.30\right)^2=9.07$$