

Supporting Information

for

High-Performance Boron-containing Phthalonitrile Resins

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Table S1: The element content of RPH, BPN and PBPN

Type of element	Theoretical value			Experimental value		
	RPH	BPN	PBPN	RPH	BPN	PBPN
C	72.92	70.41	73.14	72.02	71.24	71.79
H	2.78	2.95	3.43	2.71	2.98	3.01
O	8.83	13.40	11.46	10.80	10.83	10.92
N	15.46	11.73	10.03	15.07	13.83	13.71

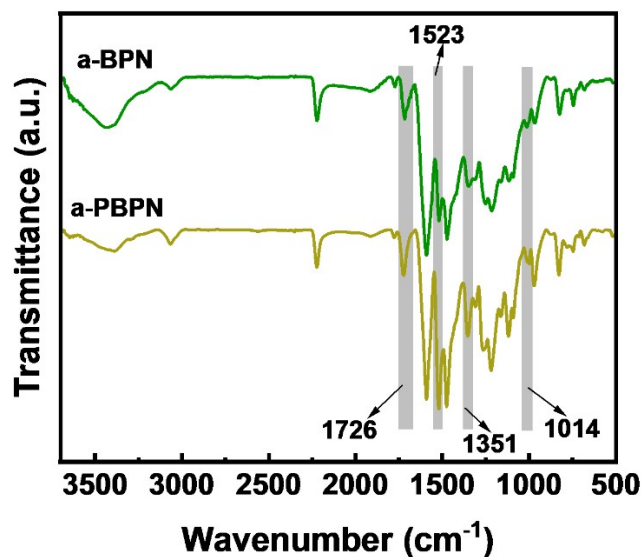


Figure S1. FT-IR spectra of a-BPN and a-PBPN.

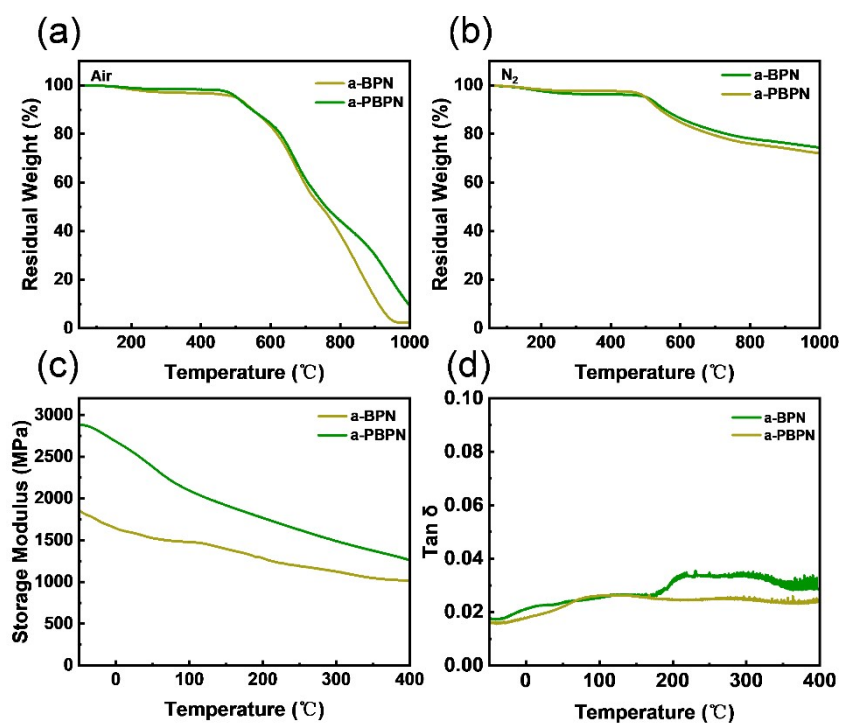


Figure S2. TG curves of a-BPN and a-PBPN in air (a) and in N_2 (b); (c) storage modulus curves of a-BPN and a-PBPN from $-50\text{ }^{\circ}\text{C}$ to $400\text{ }^{\circ}\text{C}$ in N_2 ; (d) $\tan \delta$ curves of a-BPN and a-PBPN.

Table S2. Thermal parameters of a-BPN and a-PBPN in air and N₂ atmosphere.

Sample	In air			In N ₂		
	T _{d5%} (°C)	T _{d10%} (°C)	C _{y1000°C} (%)	T _{d5%} (°C)	T _{d10%} (°C)	C _{y1000°C} (%)
a-BPN	501	548	2.45	503	554	74.37
a-PBPN	502	546	9.40	500	541	71.99

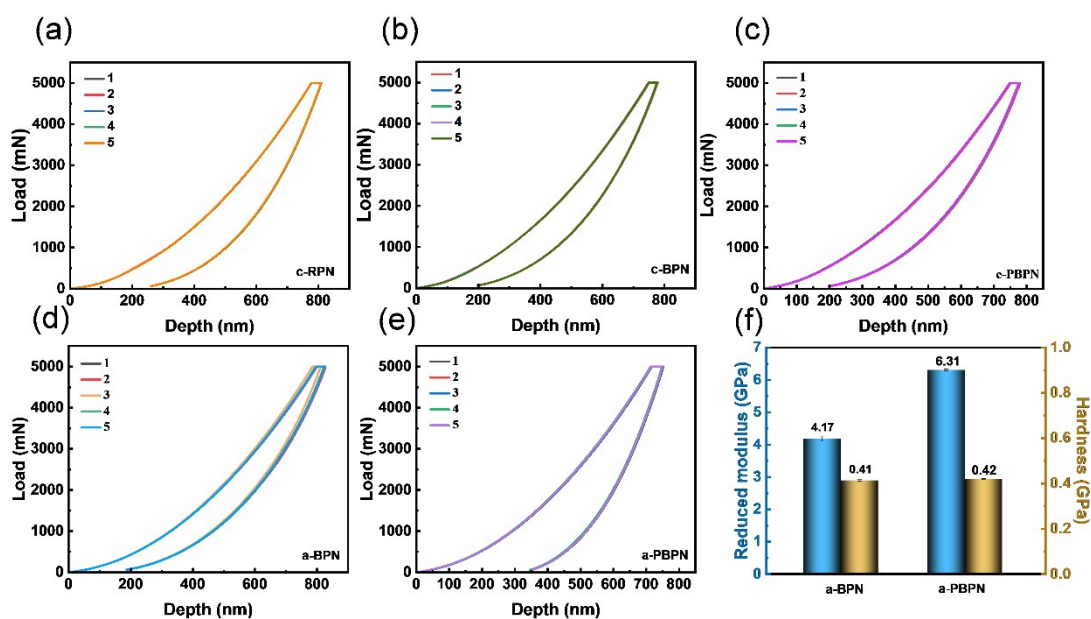


Figure S3. (a) Nanoindentation curves of c-RPN (a), c-BPN (b), c-PBPN (c), a-BPN (d), and a-PBPN (e); (f) reduced modulus and hardness of a-BPN and a-PBPN.

Table S3. Storage modulus of a-BPN and a-PBPN at different temperature segments.

Sample	Storage modulus of polymers at various temperature (MPa)							
	50 °C	100 °C	150 °C	200 °C	250 °C	300 °C	350 °C	400 °C
a-BPN	1525	1477	1395	1284	1191	1124	1046	1014
a-PBPN	2377	2094	1918	1767	1623	1490	1374	1266