

SUPPLEMENTARY MATERIAL TO
**Structural effects of the monomer type on the properties of
copolyimides and copolyimide–silica hybrid materials**

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J. Serb. Chem. Soc. 80 (8) (2015) 1061–1071

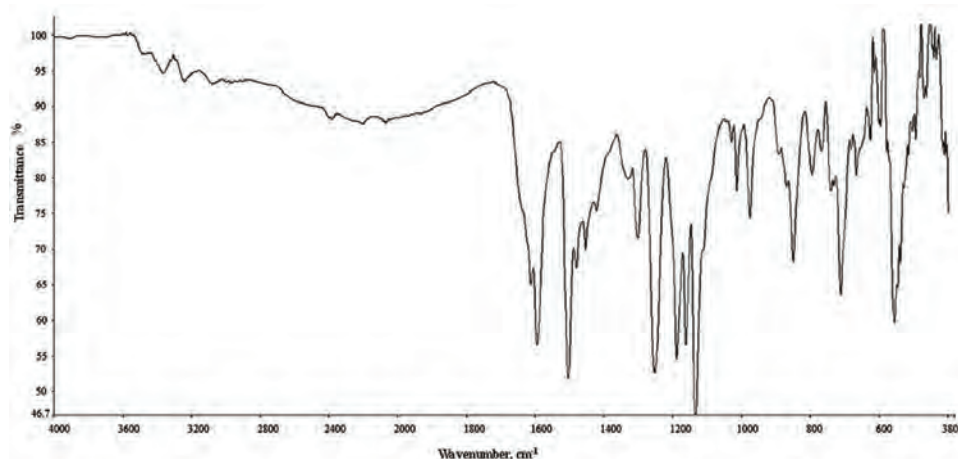


Fig. S-1. FTIR spectrum of bis[4-(3-aminophenoxy)phenyl]phenylphosphine oxide (*m*-BAPPO).

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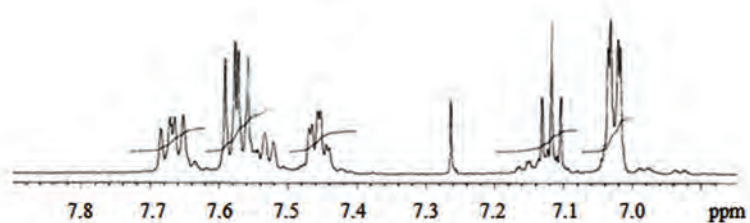
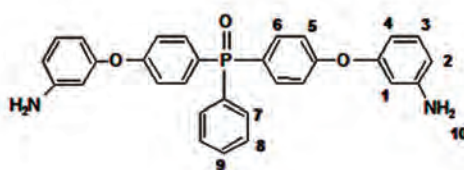
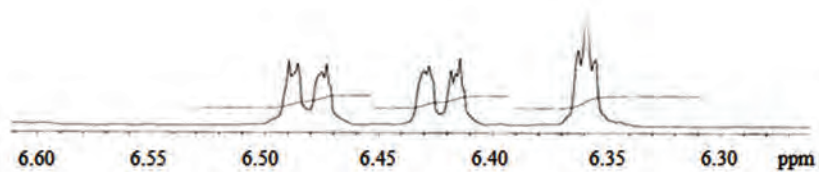


Fig. S-2. ¹H-NMR spectrum of bis[4-(3-aminophenoxy)phenyl]phenylphosphine oxide (*m*-BAPPO).

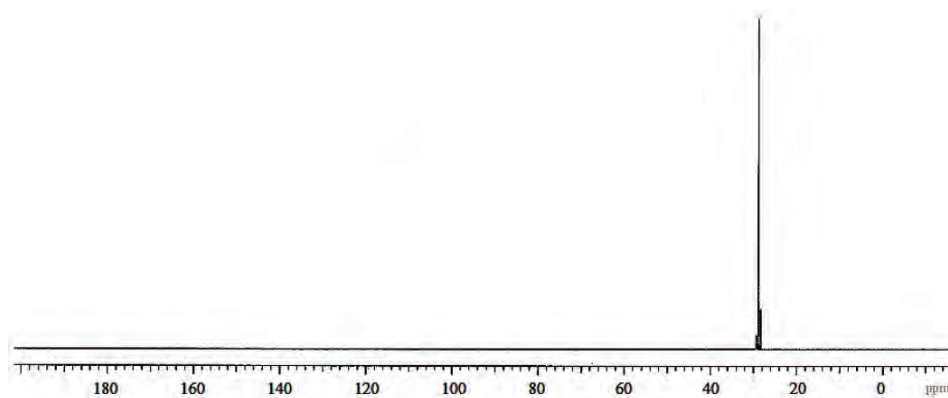


Fig. S-3. ³¹P-NMR spectrum of bis[4-(3-aminophenoxy)phenyl]phenylphosphine oxide (*m*-BAPPO).

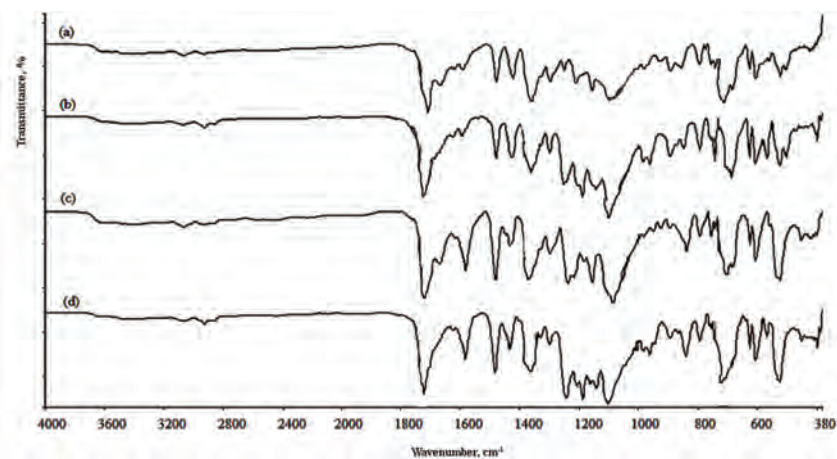


Fig. S-4. FTIR spectrum of: a) BAPPO-3,3'-DDS/6FDA copolyimide; b) BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide; c) *m*-BAPPO-3,3'-DDS/6FDA copolyimide; d) *m*-BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide.

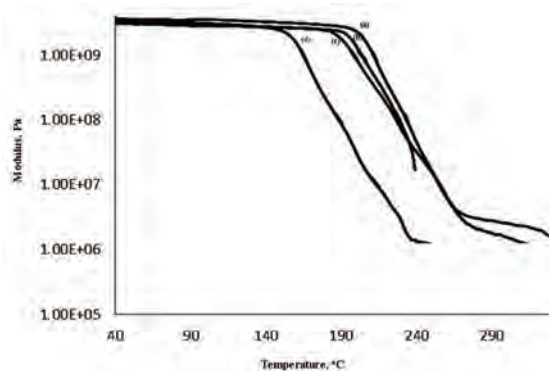


Fig. S-5. Storage (E') modulus of: a) BAPPO-3,3'-DDS/6FDA copolyimide; b) BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide; c) *m*-BAPPO-3,3'-DDS/6FDA copolyimide; d) *m*-BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide as functions of temperature.

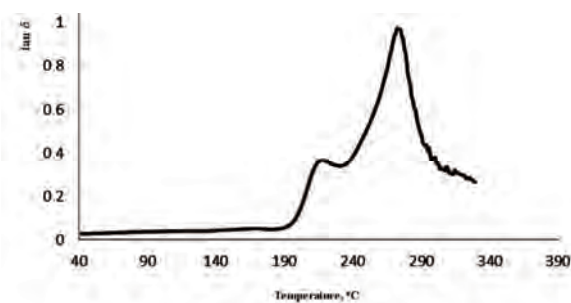


Fig. S-6. The $\tan \delta$ values of the BAPPO-3,3'-DDS/6FDA copolyimide as a function of temperature.

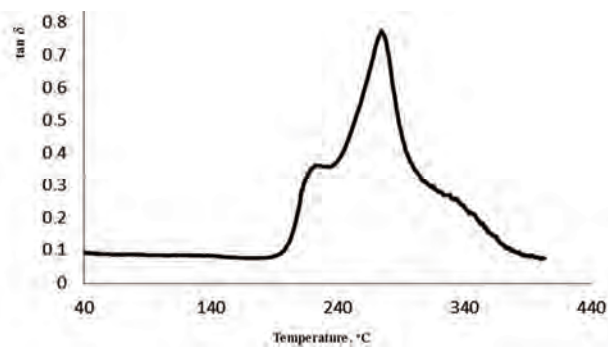


Fig. S-7. The $\tan \delta$ values of the BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide as a function of temperature.

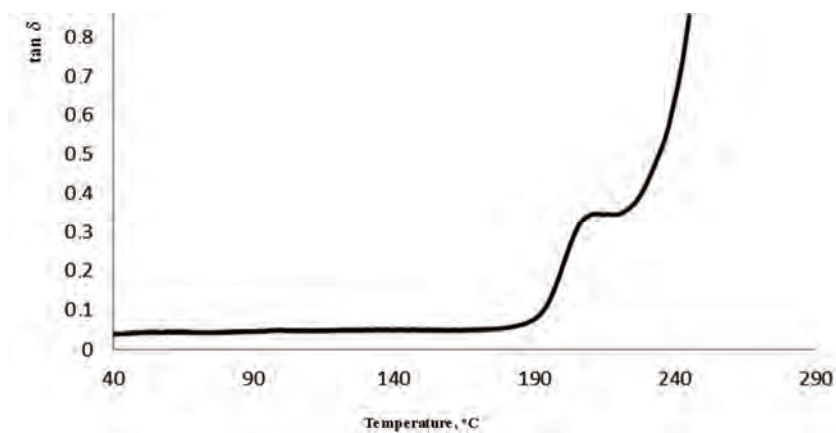


Fig. S-8. The $\tan \delta$ values of the *m*-BAPPO-3,3'-DDS/6FDA copolyimide as a function of temperature.

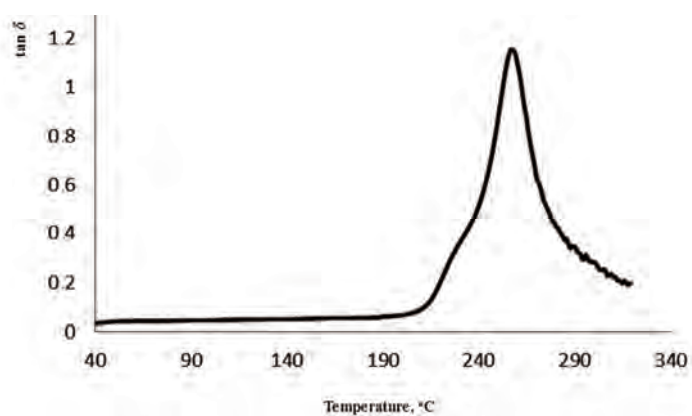


Fig. S-9. The $\tan \delta$ values of the *m*-BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide as a function of temperature.

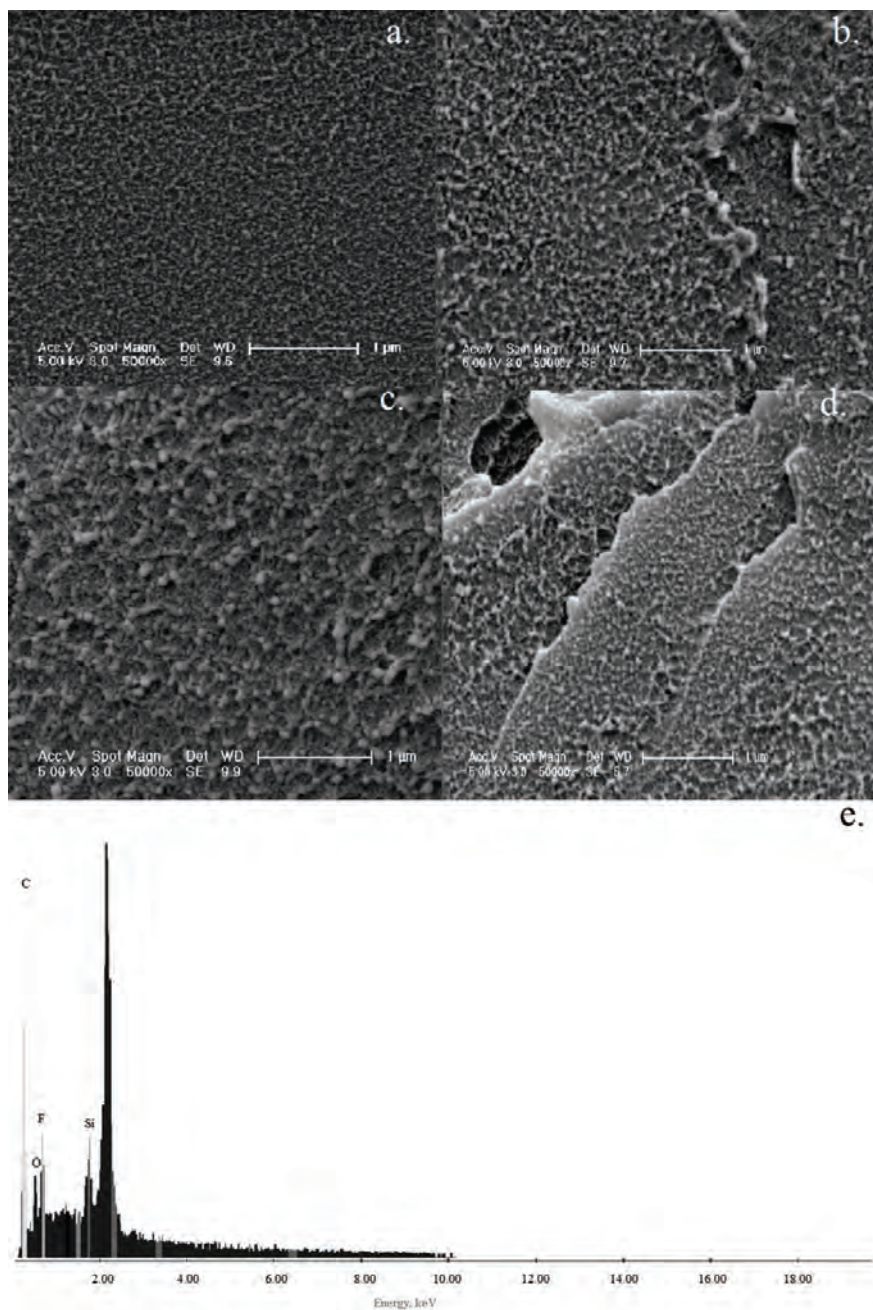
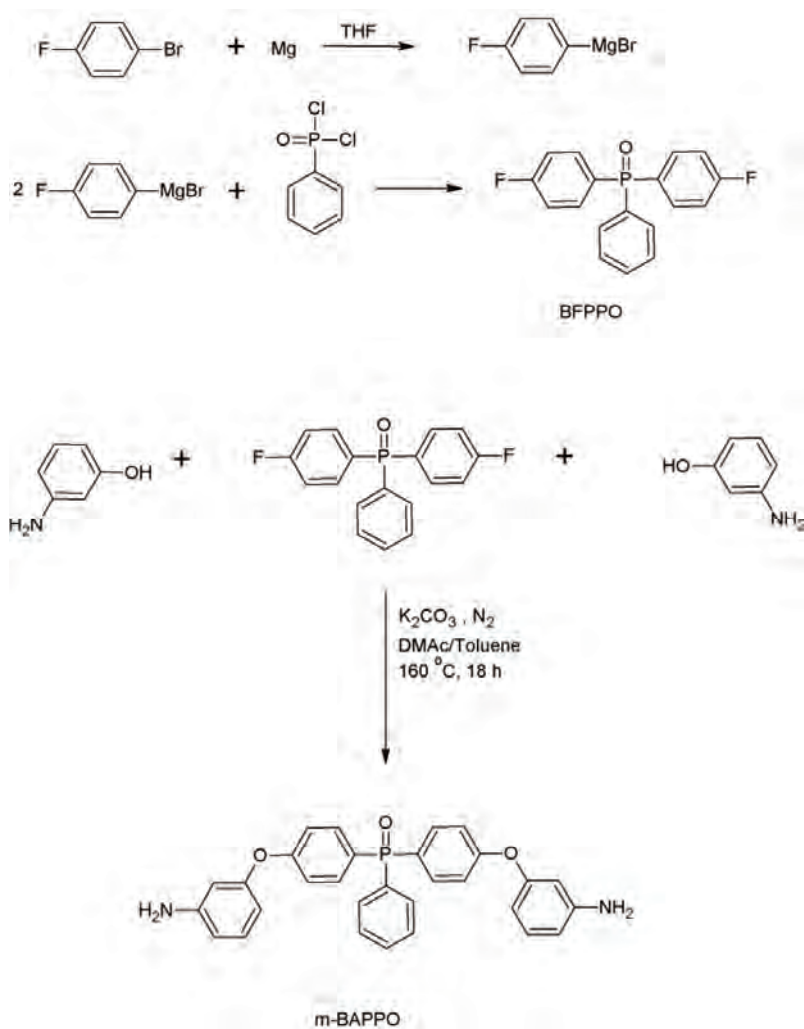
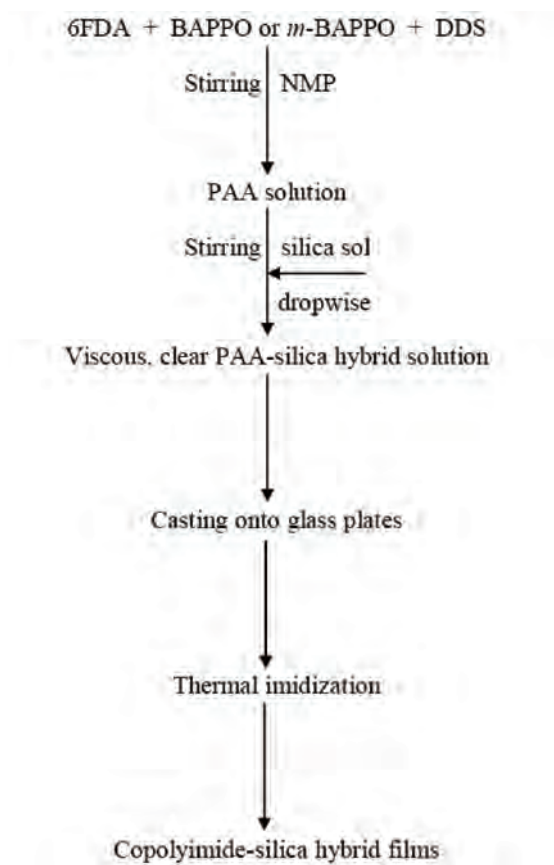


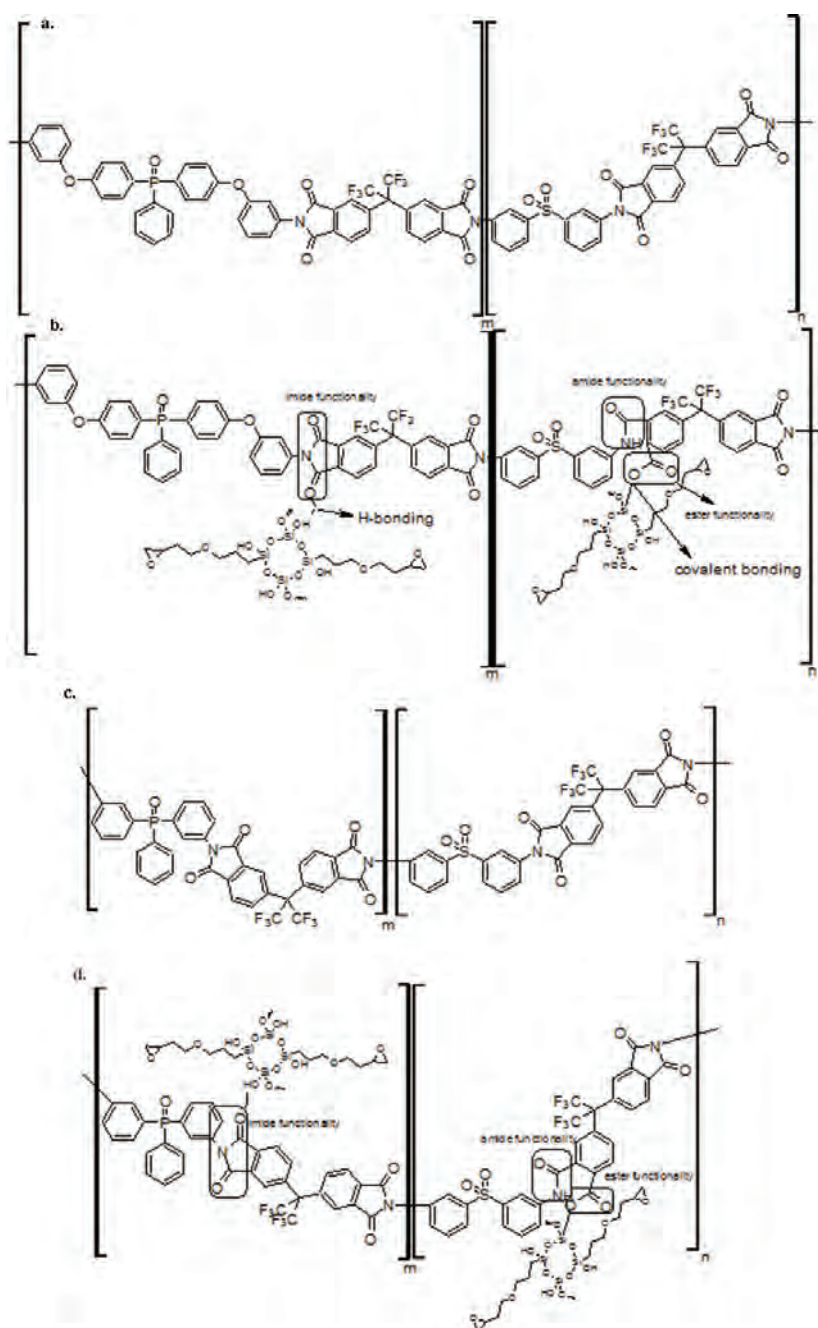
Fig. S-10. SEM image of: a) BAPPO-3,3'-DDS/6FDA copolyimide; b) *m*-BAPPO-3,3'-DDS/6FDA copolyimide; c) BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide; d) *m*-BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide; e) SEM-EDS image of BAPPO-3,3'-DDS/6FDA/SiO₂ hybrid copolyimide.



Scheme S-1. The synthesis route to bis[4-(3-aminophenoxy)phenyl]phenylphosphine oxide (*m*-BAPPO).



Scheme S-2. Preparation of copolyimide-silica hybrid films (DSS denotes 3,3'-DSS).



Scheme S-3. a and c) The chemical structure of the copolyimides; b and d) the chemical structure of the copolyimide-silica hybrids.