

Supporting Information

Enhanced Mechanical and Thermal Properties of Polyimide Films Using Hydrophobic Fumed Silica Fillers

Jongin Yeob^{1,2}, Sung Woo Hong², Won-Gun Koh^{1,*} and In Park^{2,3,*}

¹ Department of Chemical and Biomolecular Engineering, Yonsei University, 50 Yonsei-ro Seodaemun-gu, Seoul 03722, Republic of Korea

² Research Institute of Clean Manufacturing System, Korea Institute of Industrial Technology (KITECH), 89 Yangdaegiro-gil, Ipjang-myeon, Seobuk-gu, Cheonan-si, Chungnam 31056, Republic of Korea; yeopji9595@kitech.re.kr (J.Y.)

³ KITECH School, University of Science and Technology (UST), 176 Gajeong-dong, Yuseong-gu, Daejeon 34113, Republic of Korea

* Corresponding author: Email address: wongun@yonsei.ac.kr (W.G.K.), inpark@kitech.re.kr (I.P.)

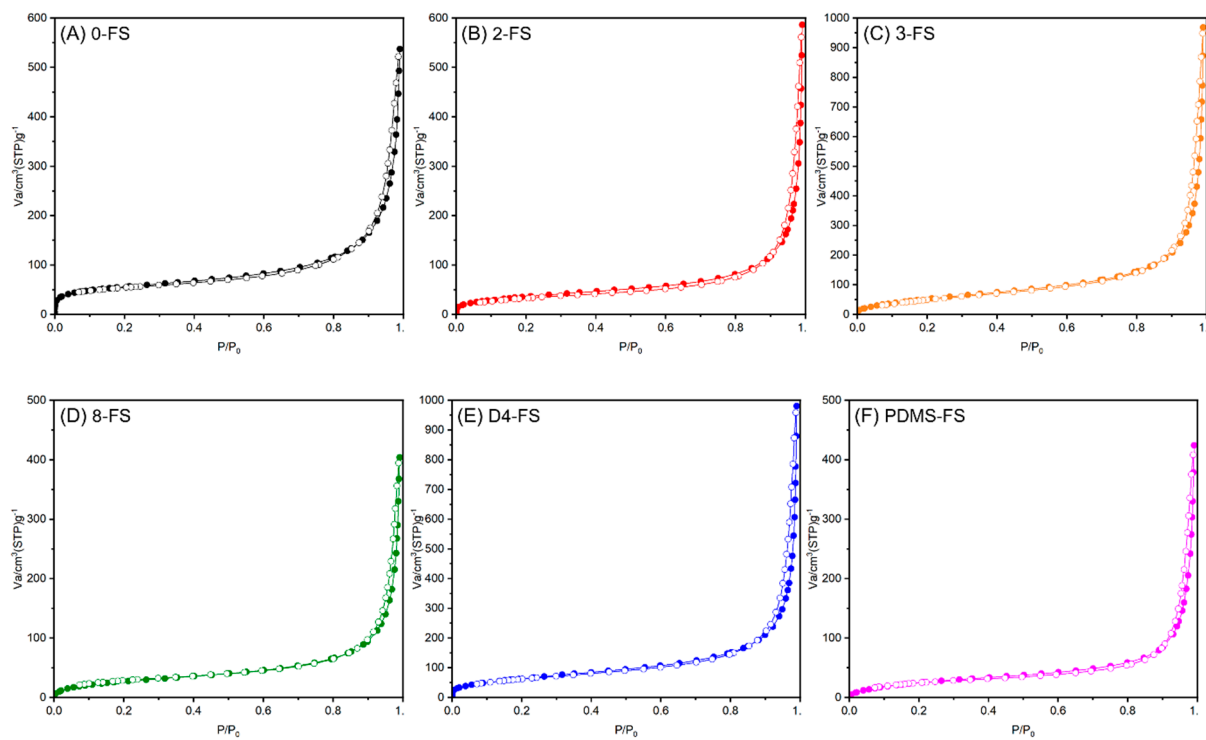


Figure S1. N₂ adsorption-desorption isotherms of FS nanoparticles used for PI/FS composite films; (A) 0-, (B) 2-, (C) 3-, (D) 8-, (E) D4-, and (F) PDMS-FS.

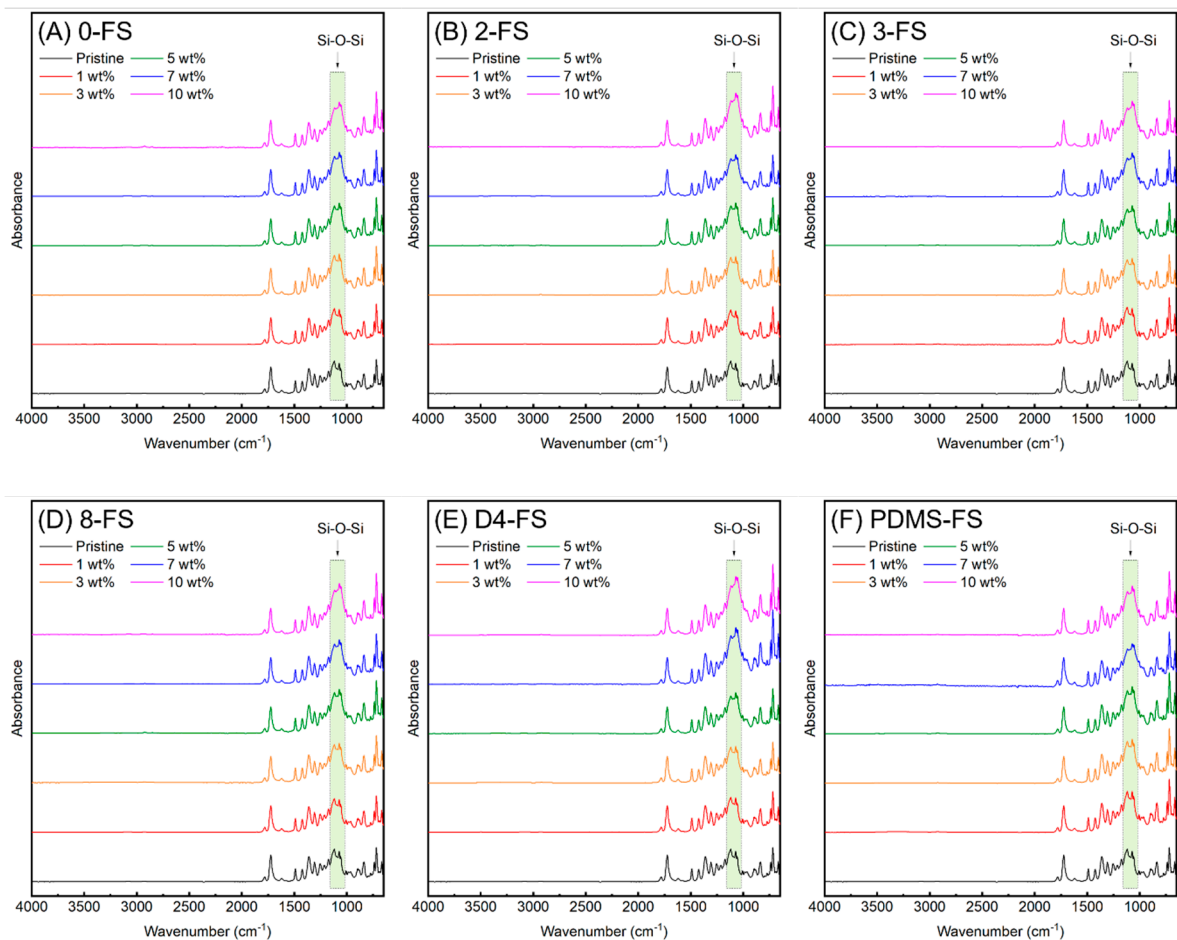


Figure S2. FT-IR spectra of the pristine PI and the PI/FS composite film containing (A) 0-, (B) 2-, (C) 3-, (D) 8-, (E) D4-, and (F) PDMS-FS. The FT-IR spectra were normalized based on the intensity of C=O stretching peak (1670 cm^{-1}) for comparison.

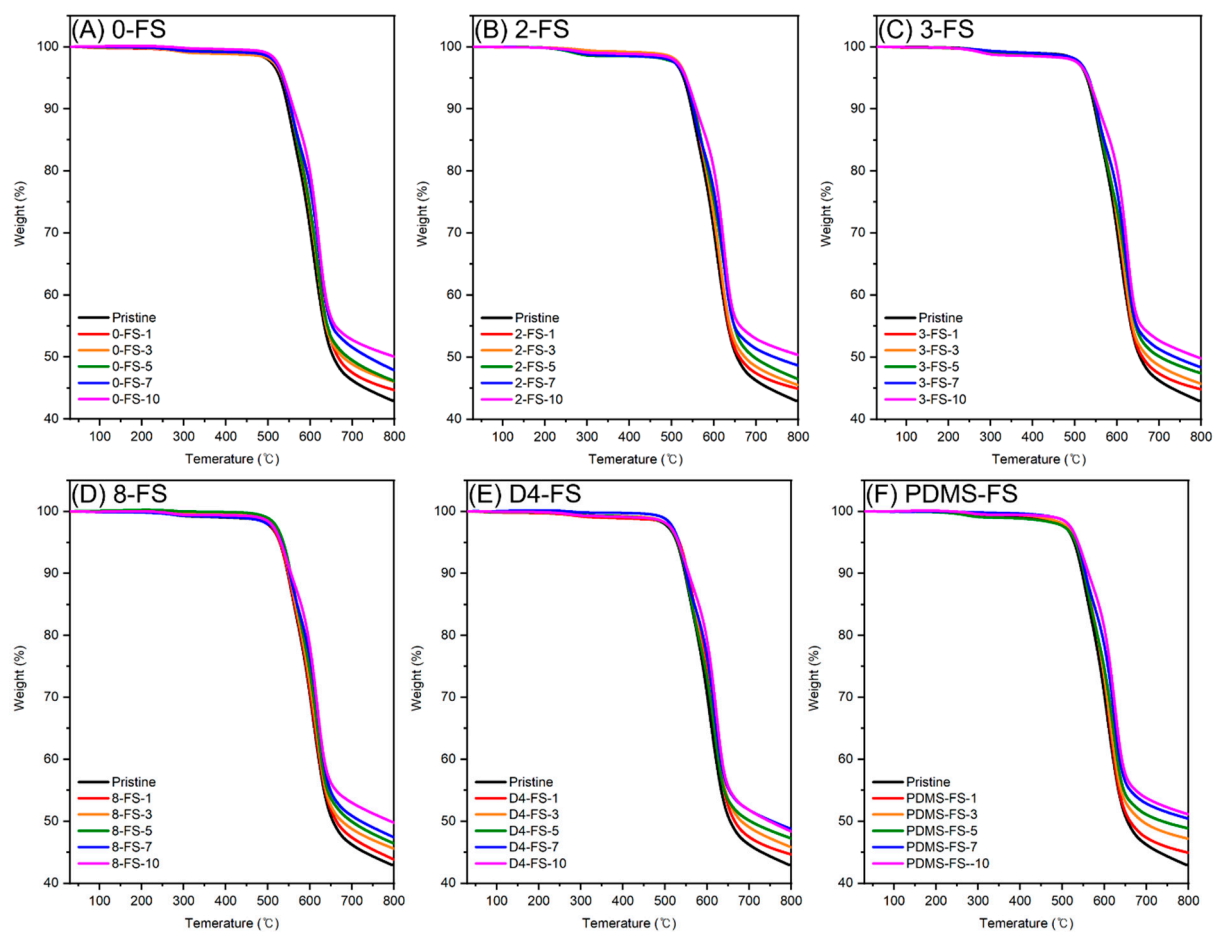


Figure S3. TGA curves of the PI/FS composite films containing (A) 0-, (B) 2-, (C) 3-, (D) 8-, (E) D4-, and (F) PDMS-FS.

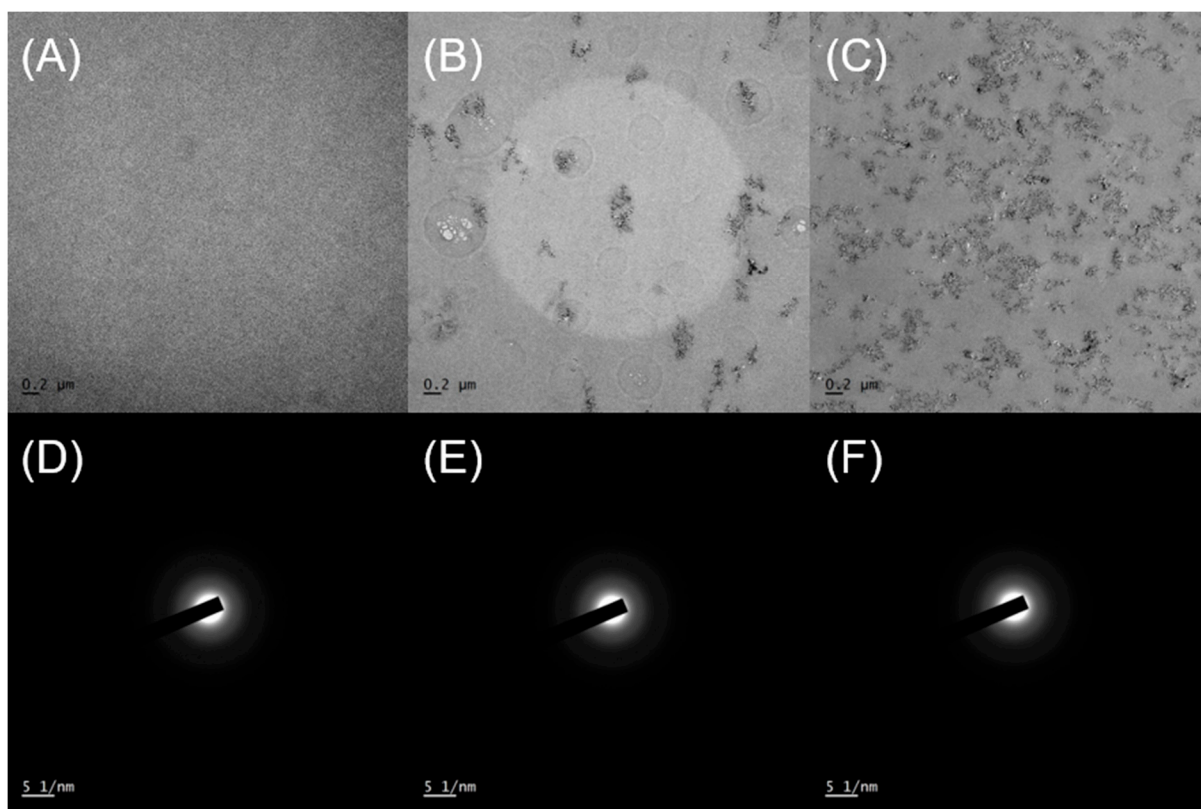
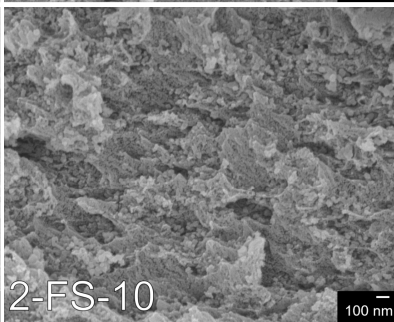
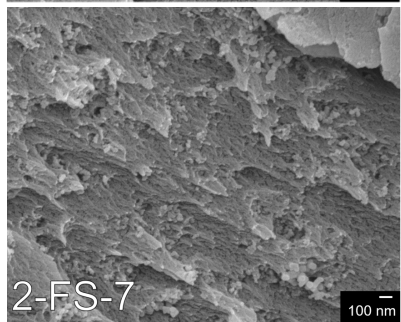
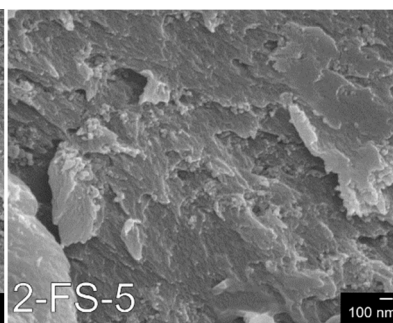
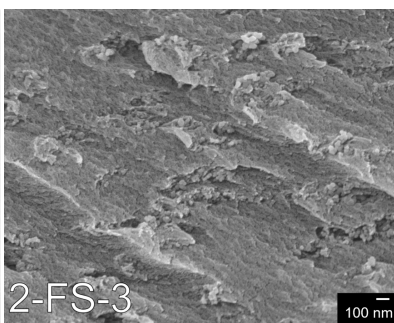
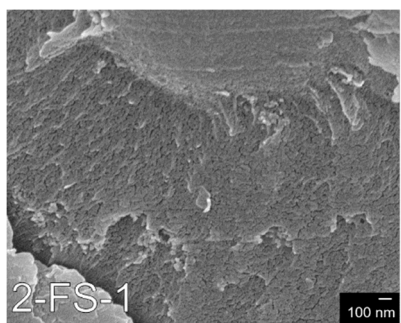
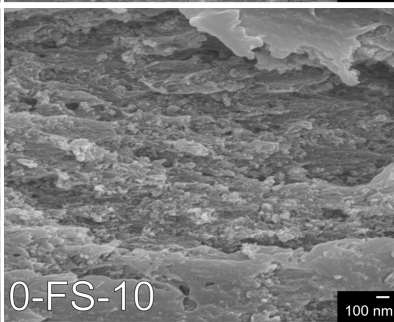
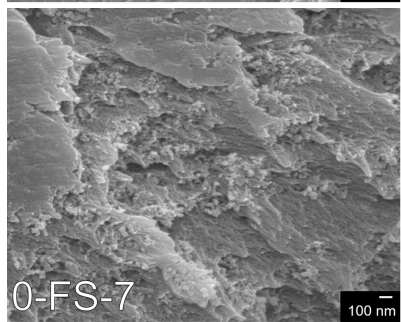
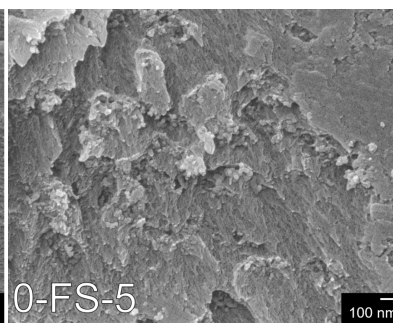
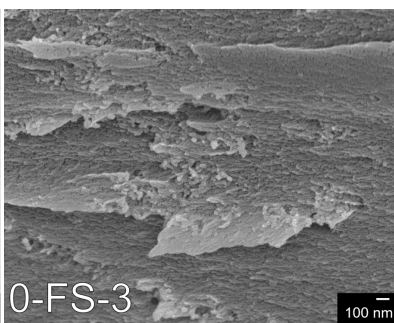
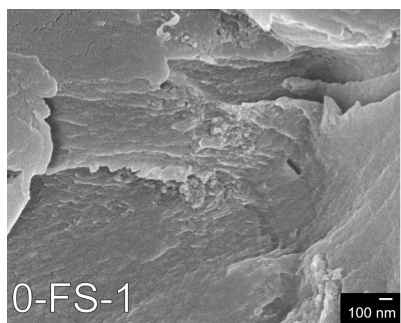
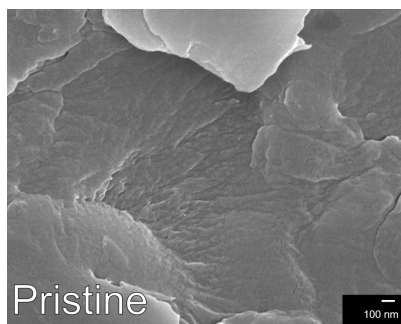
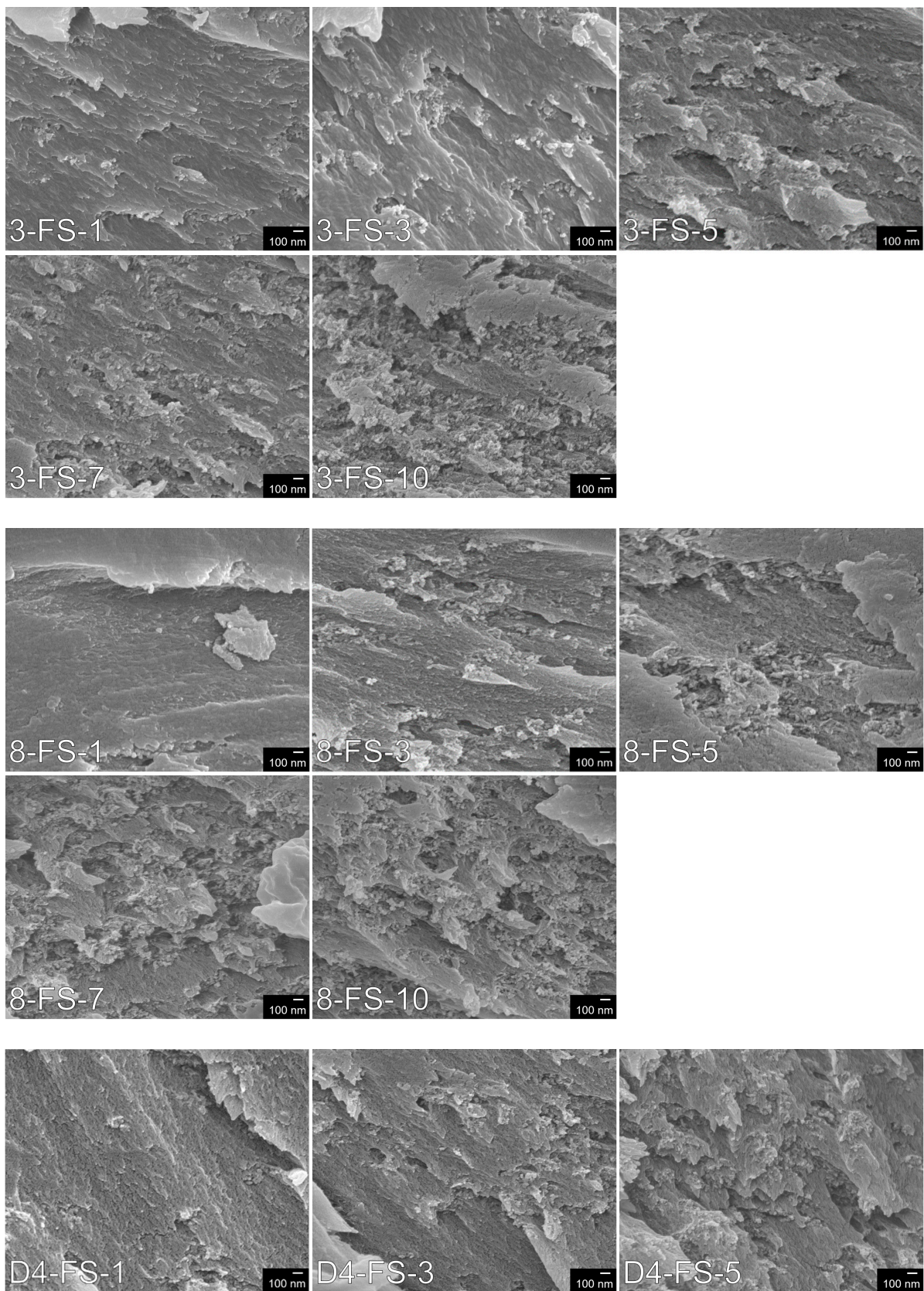


Figure S4. TEM images of (A) the pristine, (B) 3-FS-1, and (C) 3-FS-7. (D), (E), and (F) are the corresponding electron diffraction patterns to (A), (B), and (C).





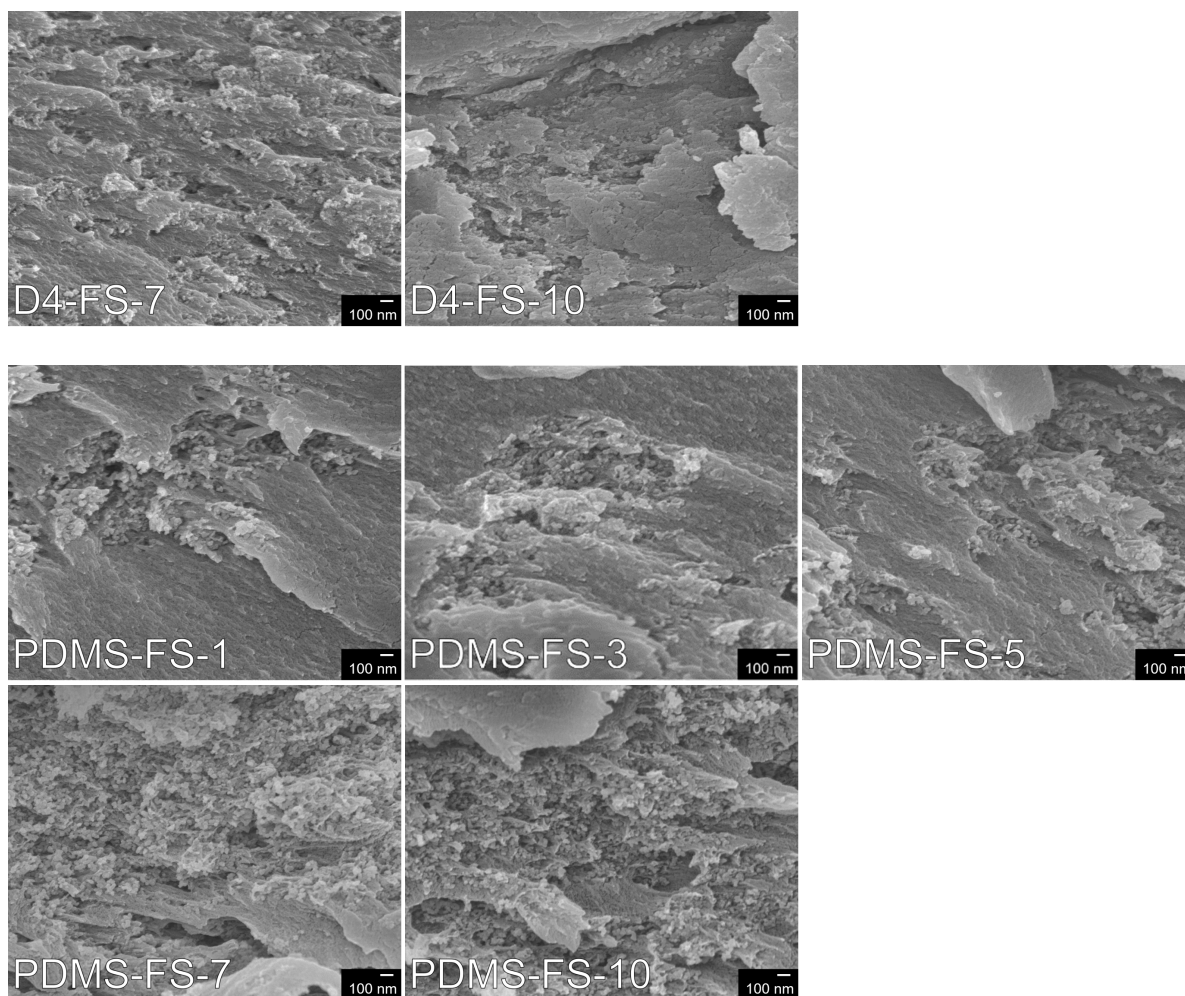


Figure S5. Cross-sectional SEM images of PI/FS composite films.

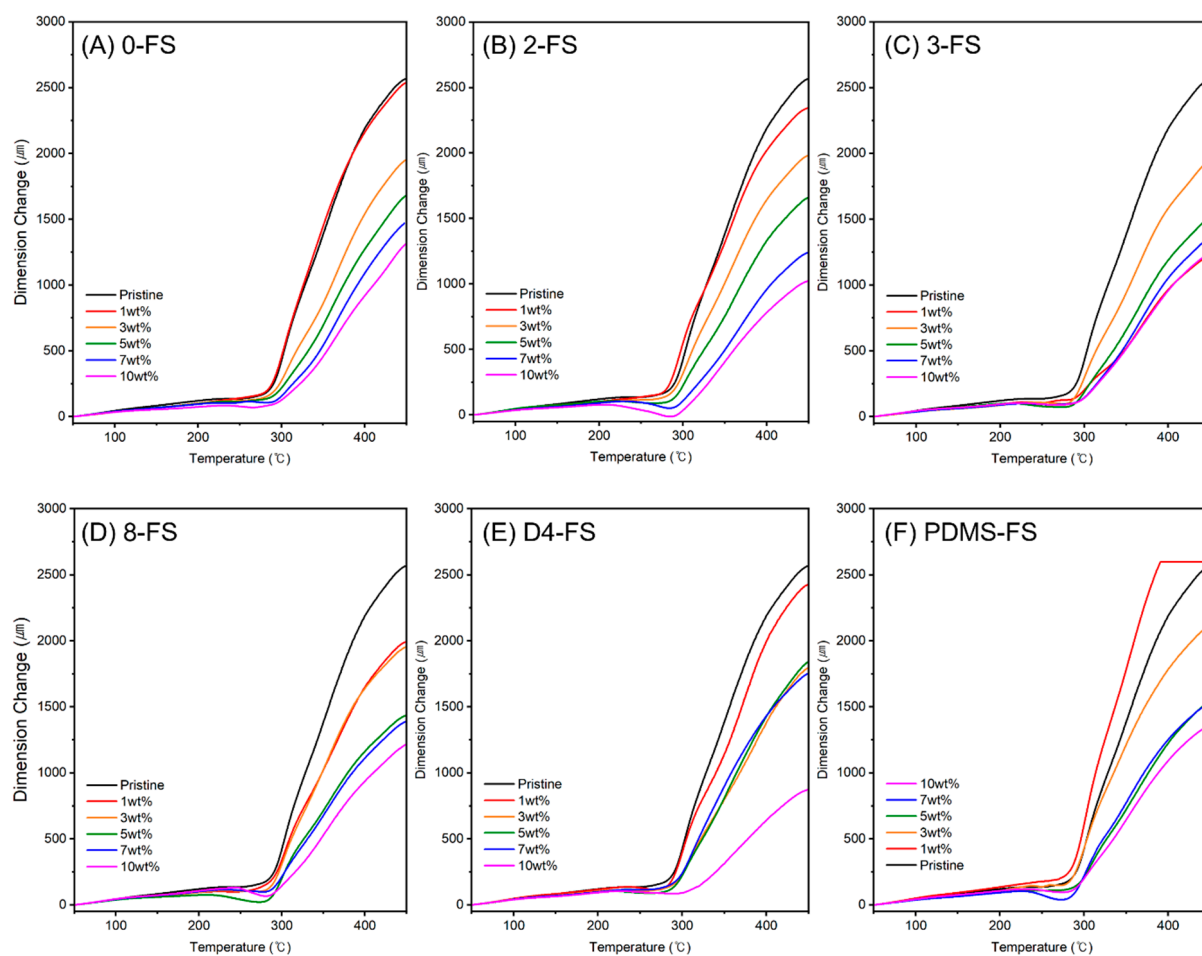


Figure S6. TMA curves of the PI/FS composite films containing (A) 0-, (B) 2-, (C) 3-, (D) 8-, (E) D4-, and (F) PDMS-FS.

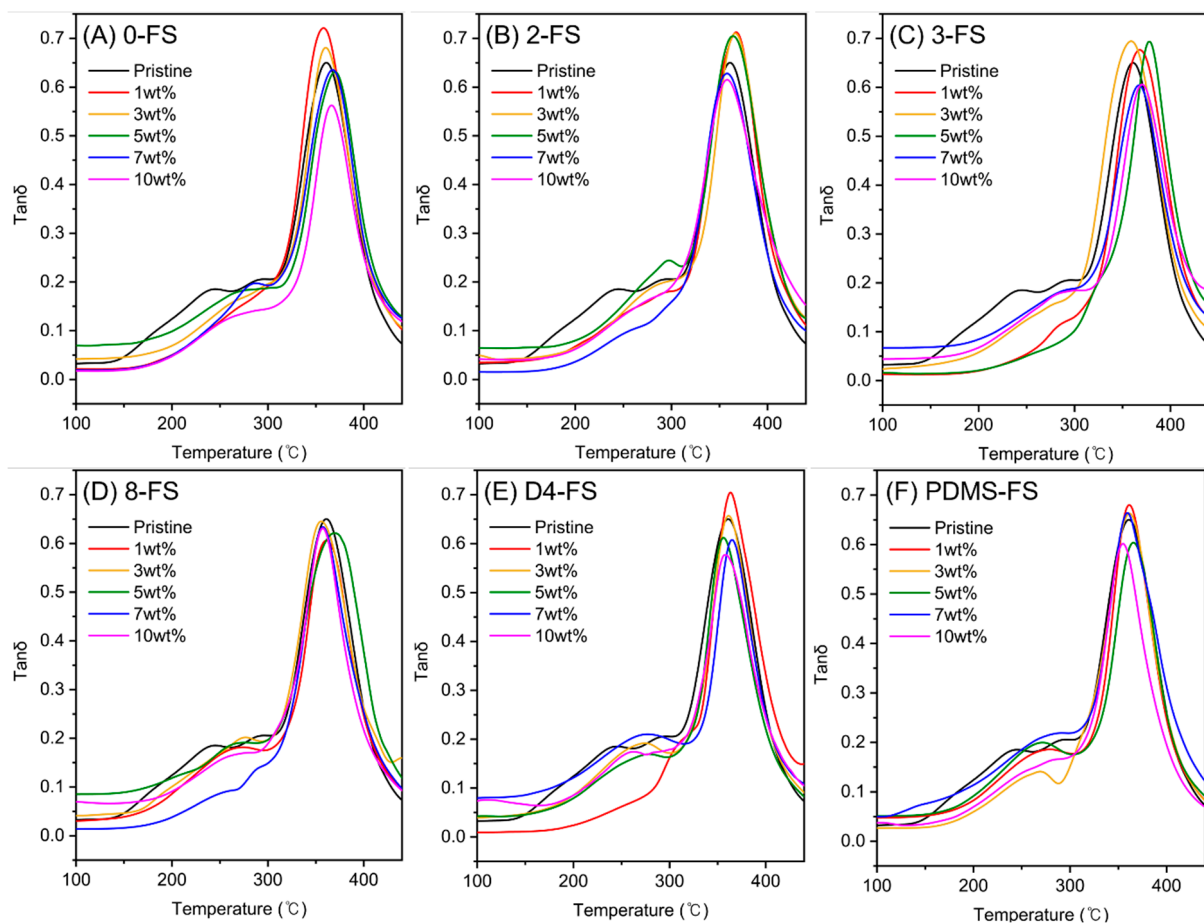


Figure S7. $\tan \delta$ curves of the PI/FS composite films containing (A) 0-, (B) 2-, (C) 3-, (D) 8-, (E) D4-, and (F) PDMS-FS.