Electronic Supplementary Material (ESI) for CrystEngComm.

Supporting information

Linker length-dependent hydrogen peroxide photosynthesis performance over crystalline covalent organic frameworks

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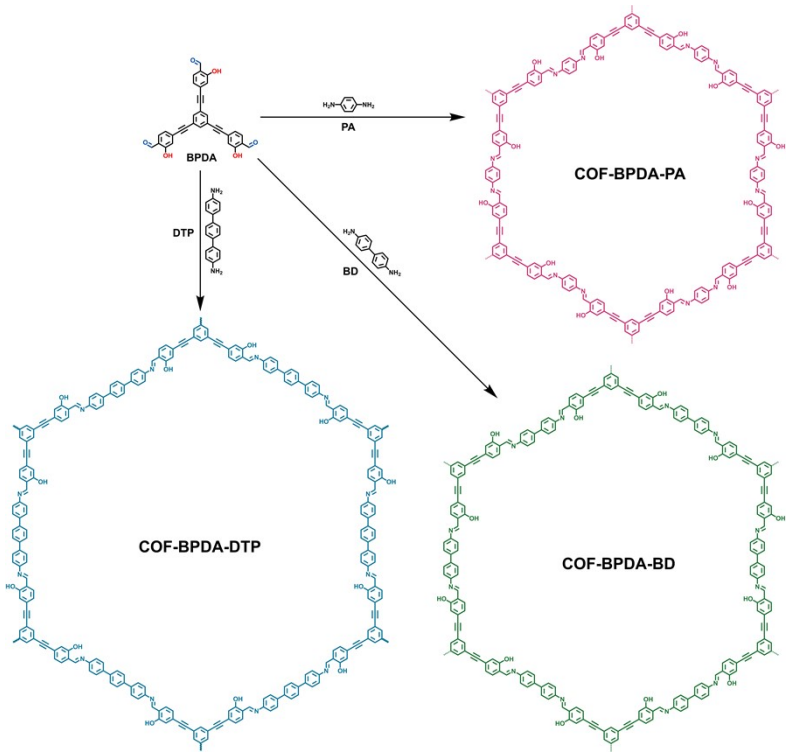

Figure S1. Synthetic route of COF-BPDA-DTP, COF-BPDA-BD and COF-BPDA-PA.

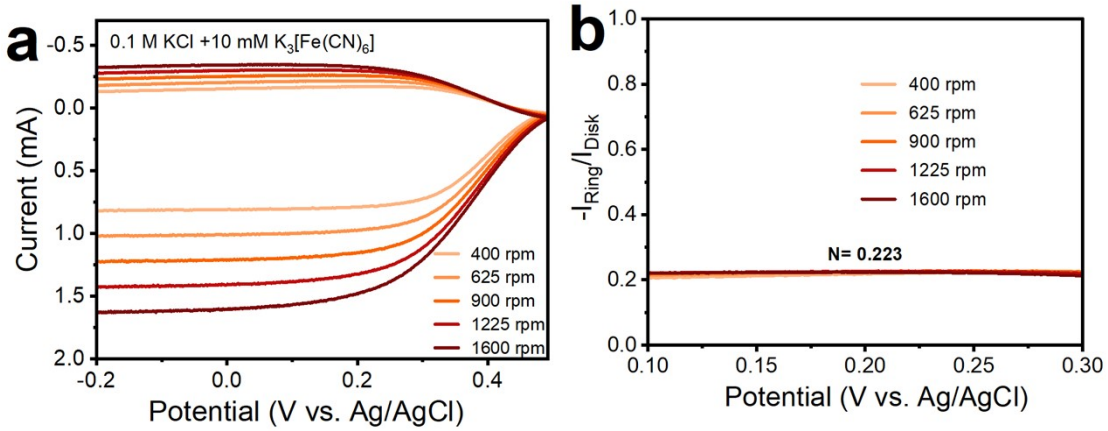

Figure S2. (a) The LSV curves at different rotate speeds. (b) The calculated collection efficiency (N) for RRDE

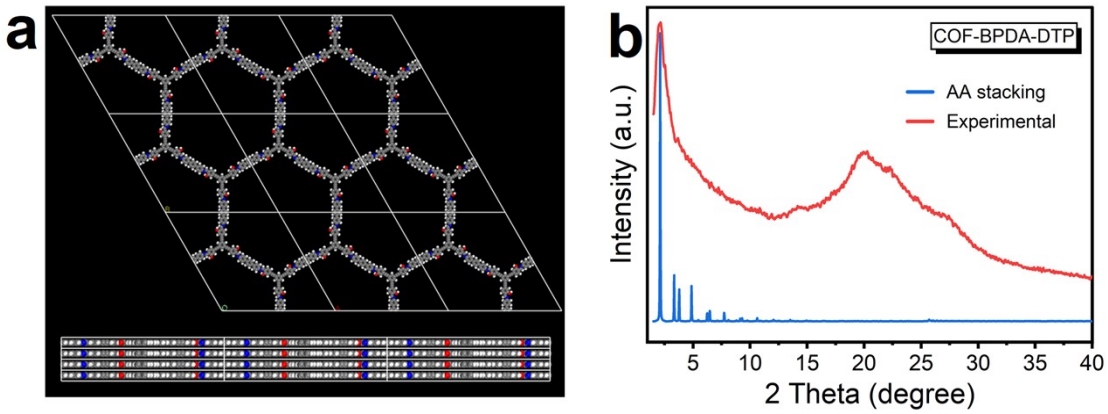

Figure S3. (a) Eclipsed (AA) stacking mode of COF-BPDA-DTP. (b) Comparison between experimental PXRD pattern and simulated pattern. White, gray, blue, and red spheres represent H, C, N, and O atoms, respectively.

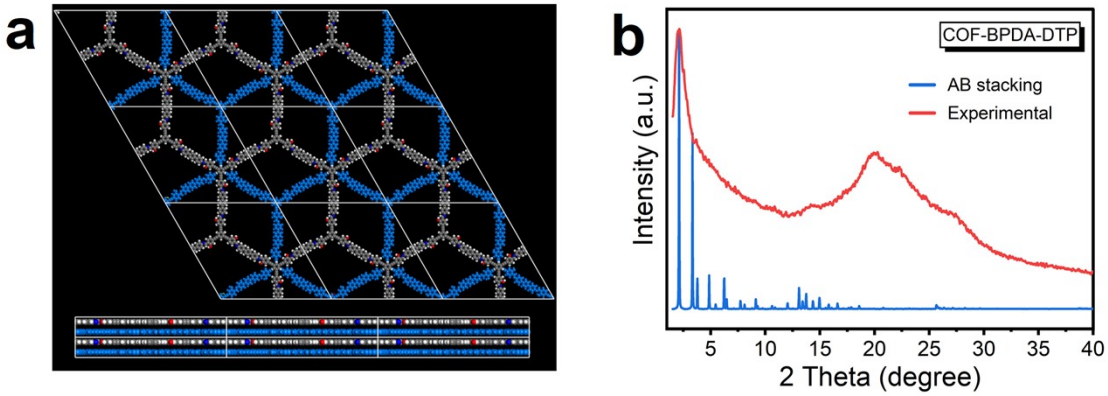

Figure S4. (a) Staggered (AB) stacking mode of COF-BPDA-DTP. (b) Comparison between experimental PXRD pattern and simulated pattern. White, gray, blue, and red spheres represent H, C, N, and O atoms, respectively; the second layer is highlighted in bule for clarity.

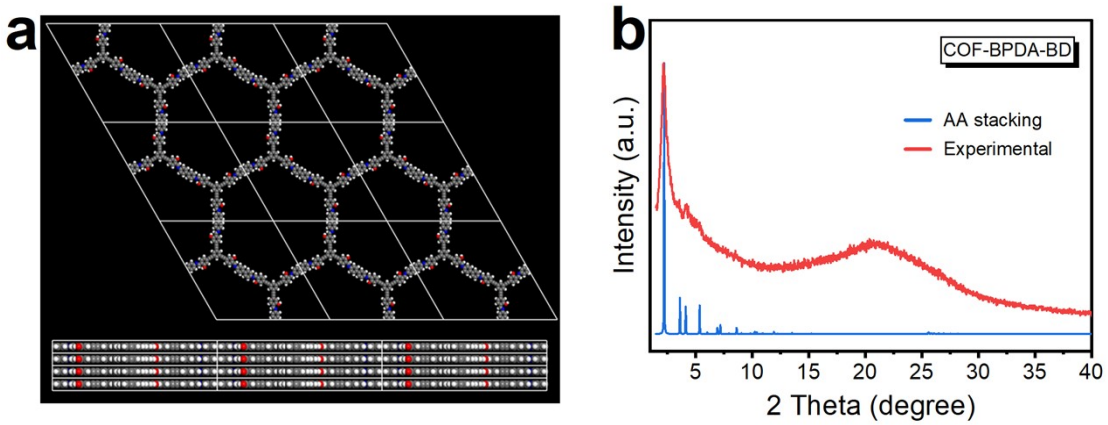

Figure S5. (a) Eclipsed (AA) stacking mode of COF-BPDA-BD. (b) Comparison between experimental PXRD pattern and simulated pattern. White, gray, blue, and red spheres represent H, C, N, and O atoms, respectively.

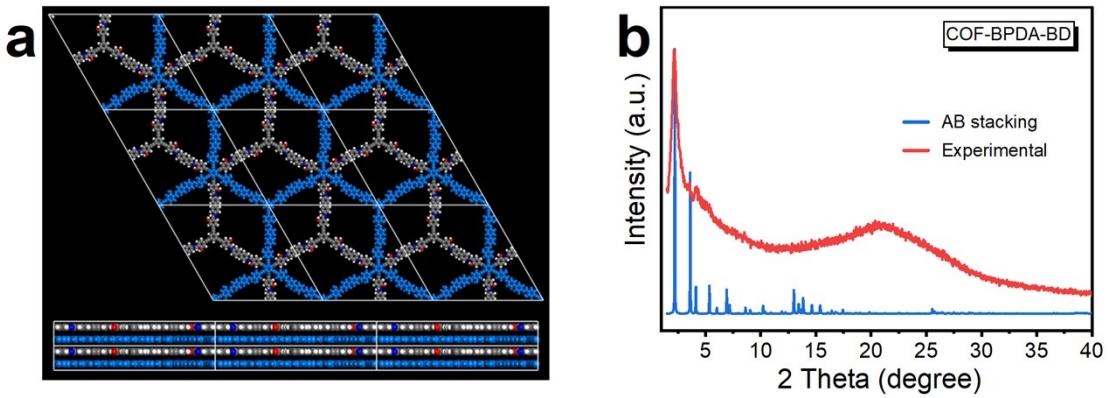

Figure S6. (a) Staggered (AB) stacking mode of COF-BPDA-BD. (b) Comparison between experimental PXRD pattern and simulated pattern. White, gray, blue, and red spheres represent H, C, N, and O atoms, respectively; the second layer is highlighted in bule for clarity.

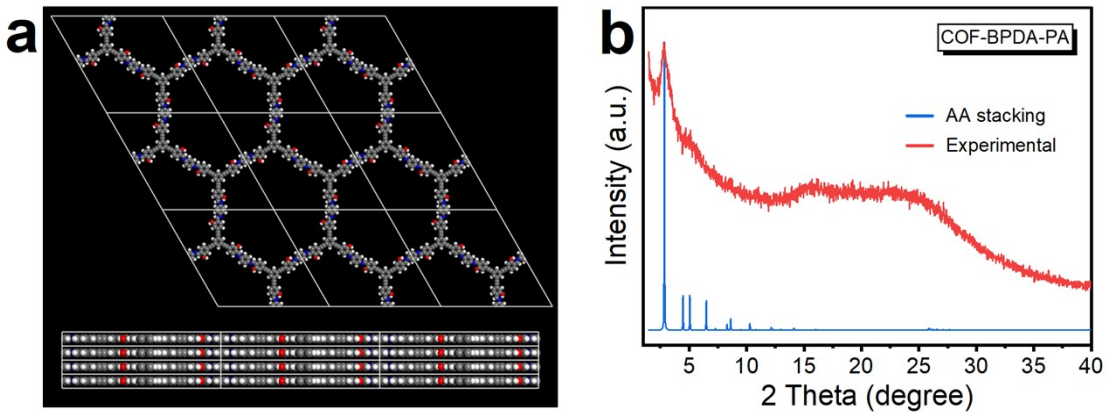

Figure S7. (a) Eclipsed (AA) stacking mode of COF-BPDA-PA. (b) Comparison between experimental PXRD pattern and simulated pattern. White, gray, blue, and red spheres represent H, C, N, and O atoms, respectively.

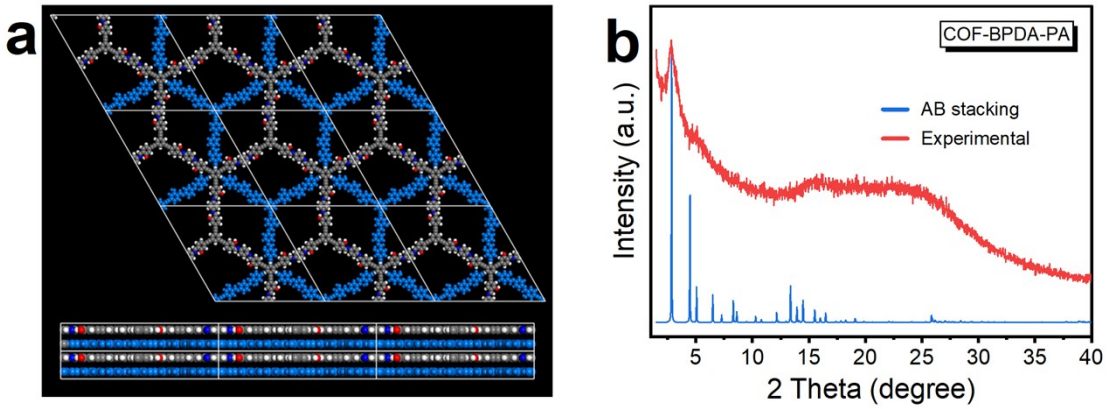

Figure S8. (a) Staggered (AB) stacking mode of COF-BPDA-PA. (b) Comparison between experimental PXRD pattern and simulated pattern. White, gray, blue, and red spheres represent H, C, N, and O atoms, respectively; the second layer is highlighted in bule for clarity.

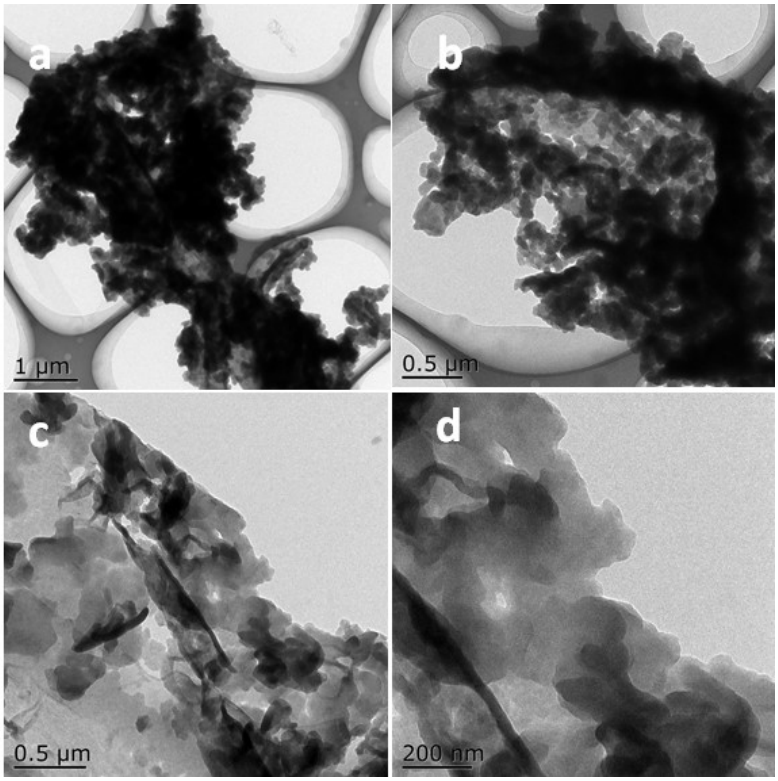

Figure S9. TEM images of COF-BPDA-BD (a and b) and COF-BPDA-PA (c and d)

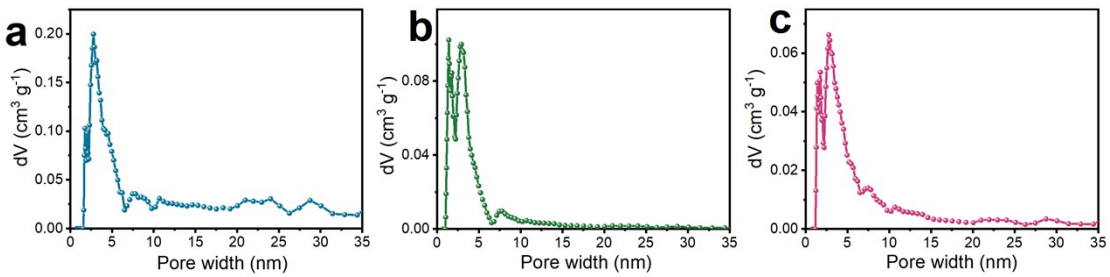

Figure S10. The pore size distributions of (a) COF-BPDA-DTP, (b) COF-BPDA-BD, and (c) COF-BPDA-PA.

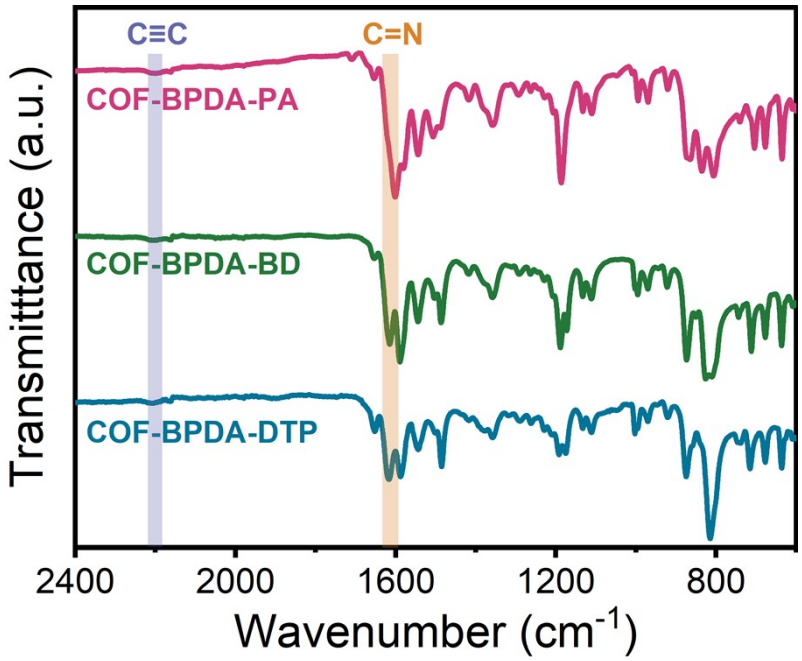

Figure S11. FT-IR spectra of COF-BPDA-DTP, COF-BPDA-BD and COF-BPDA-PA.

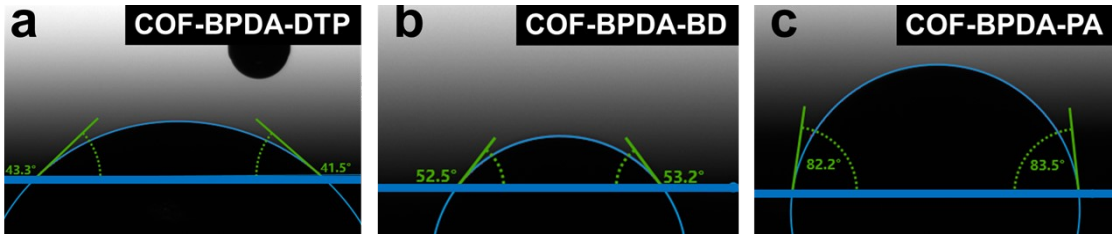

Figure S12. The water contact angle of (a) COF-BPDA-DTP, (b) COF-BPDA-BD and (C) COF-BPDA-PA.

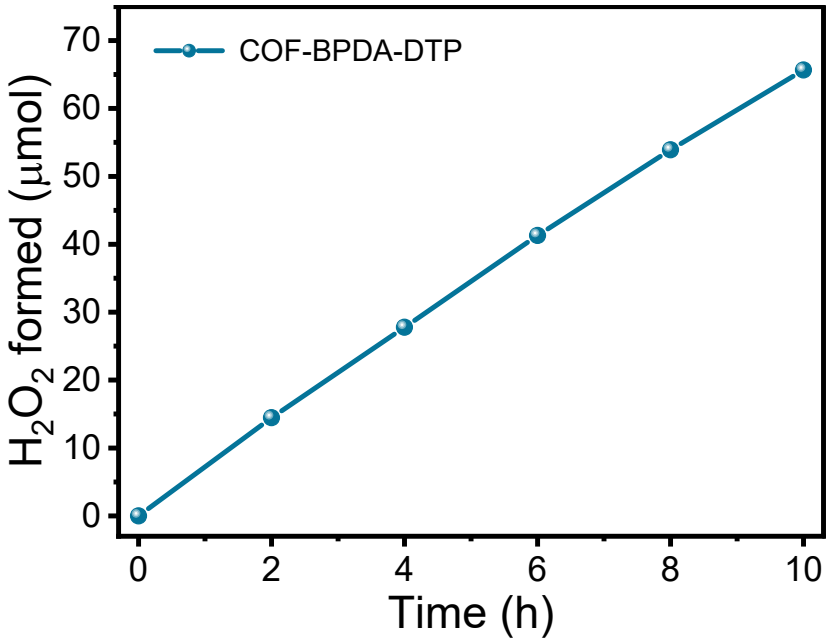

Figure S13. The time-amount curves for photocatalytic H_2O_2 production over COF-BPDA-DTP (35mg, 40 mL pure water).

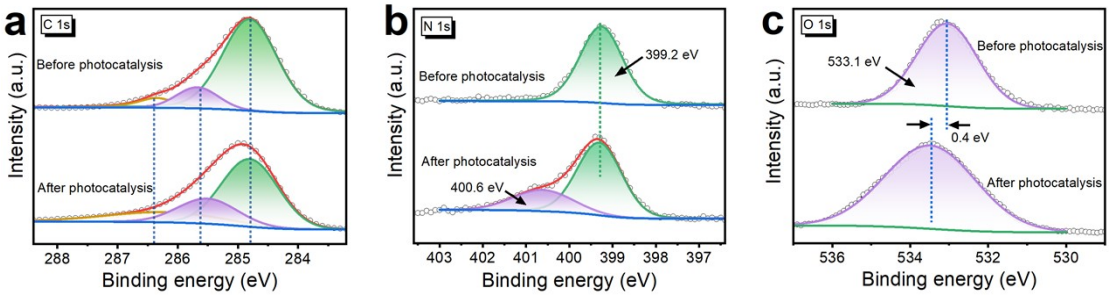

Figure S14. (a) C 1s, (b) N 1s and (c) O 1s XPS spectra of COF-BPDA-DTP before and after undergoing photocatalysis.

Table S1. The comparison of H_2O_2 production rate with other reported photocatalysts without sacrificial reagents.

Samples	H_2O_2 yield rate (μmol h^{-1} g_{cat}^{-1})	Test conditions	Irradiated conditions	Solvent	Ref.
CTF-BDDBN	97	30 mg catalysts and 50 mL water	λ＞420 nm	H_2O	S1
COF-TfpBpy	695	5 mg catalysts and 10 mL water	λ＞420 nm	H_2O	S2
MRF-250	582	50 mg catalysts and 30 mL water	λ＞420 nm	H_2O	S3
N_0-COF	1570	10 mg catalysts and 20 mL water	λ = 495 nm	H_2O	S4
1H-COF	700	30 mg catalysts and 30 mL water	λ＞420 nm	H_2O	S5
DE7-M	266	30 mg catalysts and 50 mL water	λ＞420 nm	H_2O	S6

SonoCOF-F2	1244	3 mg catalysts and 5 mL water	λ＞420 nm	H_2O	S7
HEP-TAPT-COF	1750	50 mg catalysts and 100 mL water	λ＞420 nm	H_2O	S8
FS-COFs	3904	5 mg catalysts and 20 mL water	λ＞420 nm	H_2O	S9
TTF-BT-COF	2760	5 mg catalysts and 10 mL water	λ＞420 nm	H_2O	S10
TTF-pT-COF	996				
TPE-BT-COF	592				
COF-BPDA-PA	450	5 mg catalysts and 40 mL water	λ＞420 nm	H_2O	This work
COF-BPDA-BD	1040			H_2O	
COF-BPDA-DTP	1164			H_2O	

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