

*Supplementary Materials for*

**Simultaneously enhancing the flame retardancy, water resistance, and mechanical properties of flame-retardant polypropylene via a linear vinyl polysiloxane coating ammonium polyphosphate**

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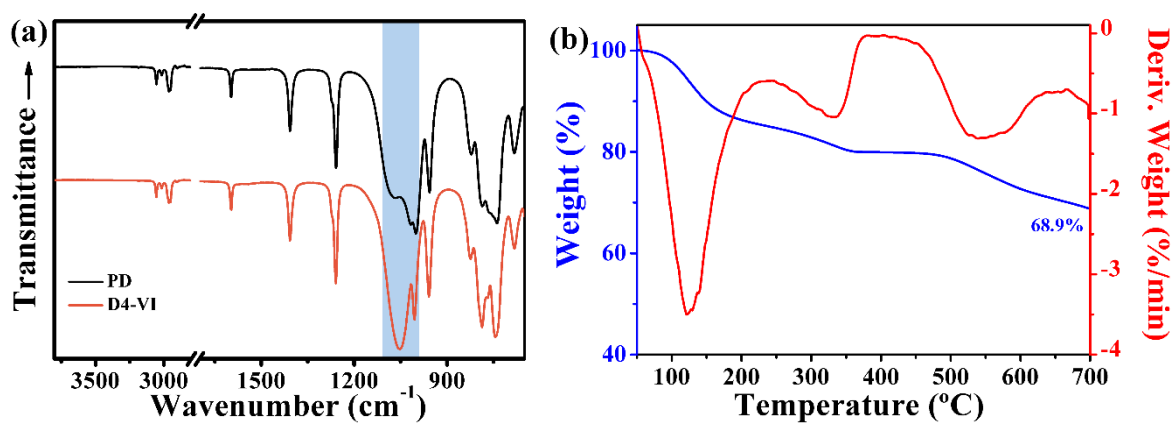
Table S1 Formulas of the PP composites.

Sample	PP (wt.%)	APP(@PD) <sup>a</sup> (wt.%)	DPER (wt.%)	PD (wt.%)	B215 <sup>b</sup> (wt.%)
PP	99.7	0	0	0	0.3
PP/25APP	74.7	25	0	0	0.3
PP/25APP@PD	74.7	25	0	0	0.3
PP/25(APP/DPER)	74.7	20.0	5.0	0	0.3
PP/25(APP@PD/DPER)	74.7	20.0	5.0	0	0.3
PP/19(APP/DPER)	80.7	15.2	3.8	0	0.3
PP/19(APP@PD/DPER)	80.7	15.2	3.8	0	0.3

**Note:** <sup>a</sup> APP or APP@PD, <sup>b</sup> B215 was consisted of 1010 and 168 with a ratio of 1:2.

Table S2 Surface elemental content of APP@PD tested by XPS.

Sample	C(atom%)	P (atom%)	O(atom%)	N(atom%)	Si(atom%)
APP	29.5	12.6	39.4	18.5	-
APP@PD	59.2	-	19.4	-	21.4



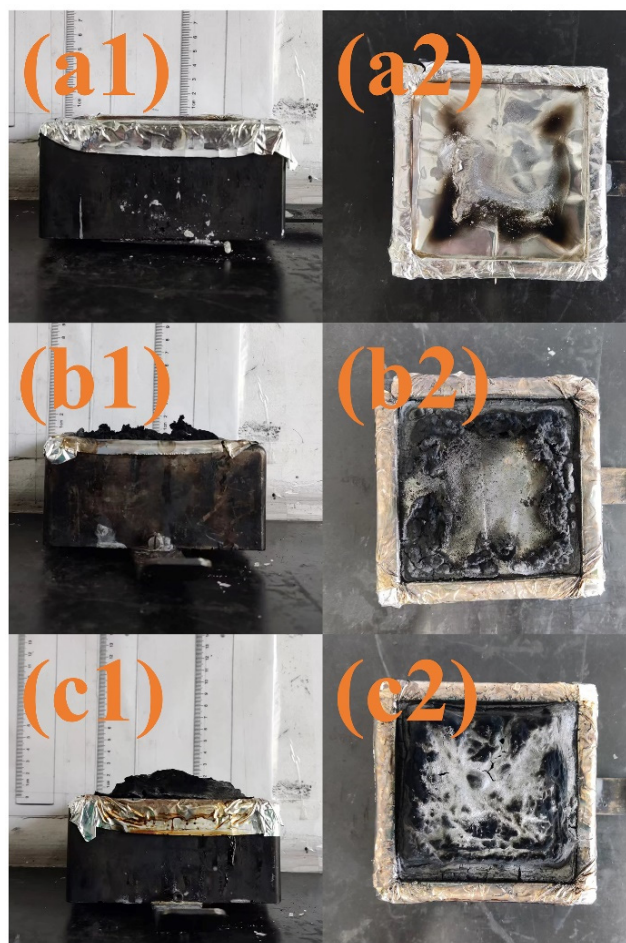
**Figure S1.** (a) FTIR spectra of PD and D4-VI; (b) TGA and DTG curves of PD.



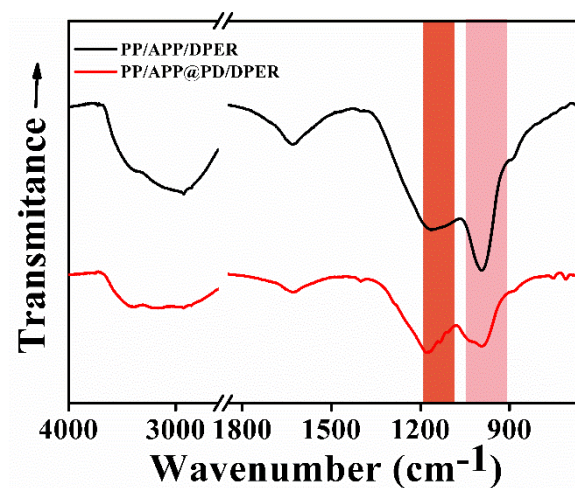
**Figure S2.** Dispersion of APP and APP@PD in water after resting for 1h.

Table S3 Cone calorimeter data of PP and its composites.

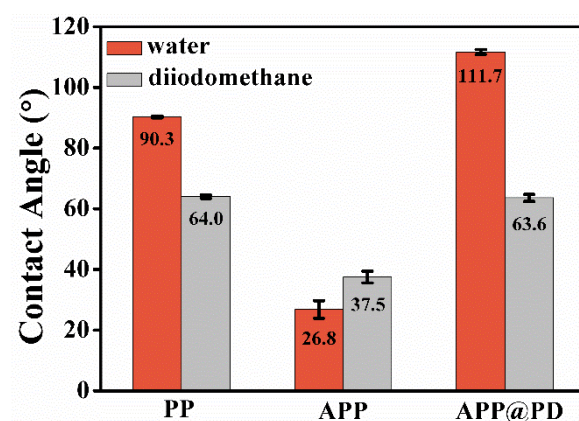
Sample	PP	PP/APP/DPER	PP/APP@PD/ DPER
TTI (s)	21	18	16
PHRR ( $\text{kW}\cdot\text{m}^{-2}$ )	783	412	304
THR ( $\text{MJ}\cdot\text{m}^{-2}$ )	92.9	84.5	84.2
av-EHC ( $\text{MJ}\cdot\text{kg}^{-1}$ )	42.5	35.4	37.3
TSP ( $\text{m}^2$ )	11.5	18.2	15.2
PSPR ( $\text{m}^2\cdot\text{s}^{-1}$ )	0.093	0.088	0.073
$T_{\text{PSPR}}$ (s)	120	205	390
Residue (wt.%)	0	9.4	12.3



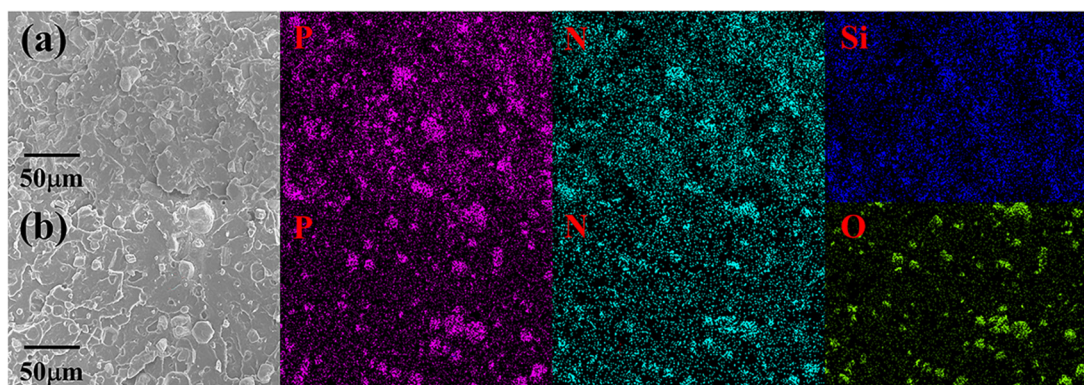
**Figure S3.** Digital photos of the residue of PP (a), PP/APP/DPER (b), and PP/APP@PD/DPER (c) after CCT. (1: side view, 2: top view)



**Figure S4.** FTIR spectra of char residues of PP/APP/DPER, PP/APP/PD/DPER, and PP/APP@PD/DPER composites.



**Figure S5.** Water and diiodomethane contact angle of PP, APP, and APP@PD.



**Figure S6.** Images of SEM and EDS mapping of the PP/APP@PD (a) and PP/APP (b) composites after the brittle fracture treatment with liquid nitrogen.