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Vinyl ethers and epoxides photoinduced copolymerization with perfluoropolyalkylether monomers

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## Supporting Information

# Vinyl ethers and epoxides photoinduced copolymerization with perfluoropolyalkylether monomers

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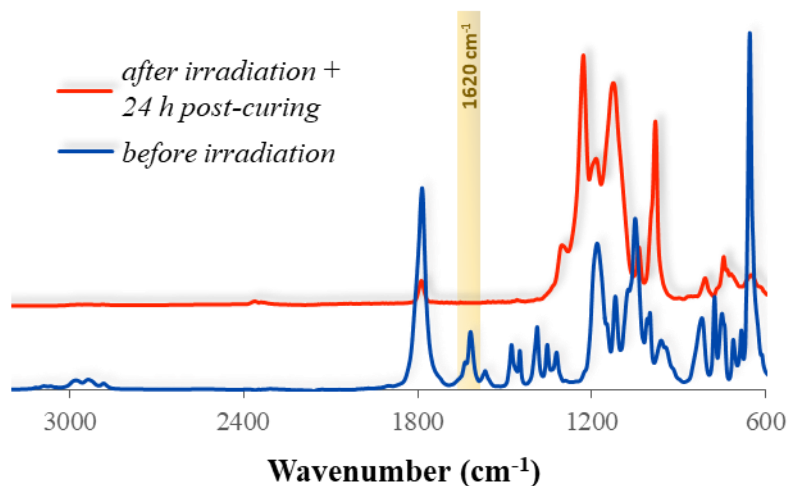
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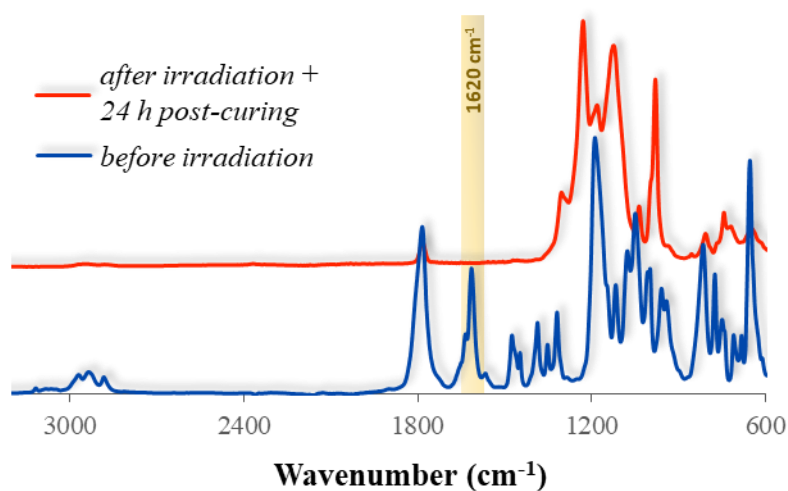


**Fig. S1** ATR FT-IR spectra of the PFPAE-EGVE + TVE copolymer:

**R<sub>h</sub>**: peak  $\sim 1780\text{ cm}^{-1}$  C=O bond;  $\sim 1620\text{ cm}^{-1}$  C=C; peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers;

**R<sub>f</sub>**: peak  $\sim 1240\text{ cm}^{-1}$  stretching C-F bond, and peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers;

**Photoinitiator**: peak  $\sim 2950\text{ cm}^{-1}$  stretching C=C-H; peak  $\sim 1780\text{ cm}^{-1}$  C=O bond; peak  $\sim 1600\text{-}1320\text{ cm}^{-1}$  C<sub>6</sub>H<sub>6</sub> bonds; peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers

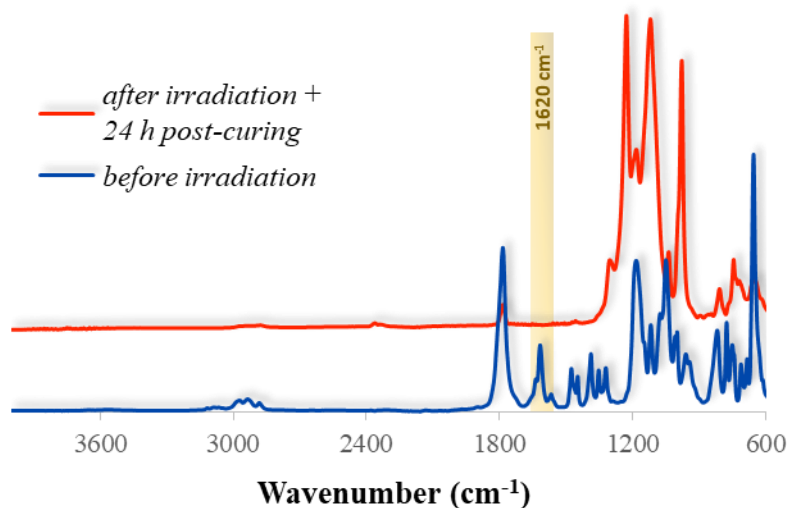


**Fig. S2** ATR FT-IR spectra of the PFPAE-BGVE + TVE copolymer:

**R<sub>h</sub>**: peak  $\sim 1780\text{ cm}^{-1}$  C=O bond;  $\sim 1620\text{ cm}^{-1}$  C=C; peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers;

**R<sub>f</sub>**: peak  $\sim 1240\text{ cm}^{-1}$  stretching C-F bond, and peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers;

**Photoinitiator**: peak  $\sim 2950\text{ cm}^{-1}$  stretching C=C-H; peak  $\sim 1780\text{ cm}^{-1}$  C=O bond; peak  $\sim 1600\text{-}1320\text{ cm}^{-1}$  C<sub>6</sub>H<sub>6</sub> bonds; peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers

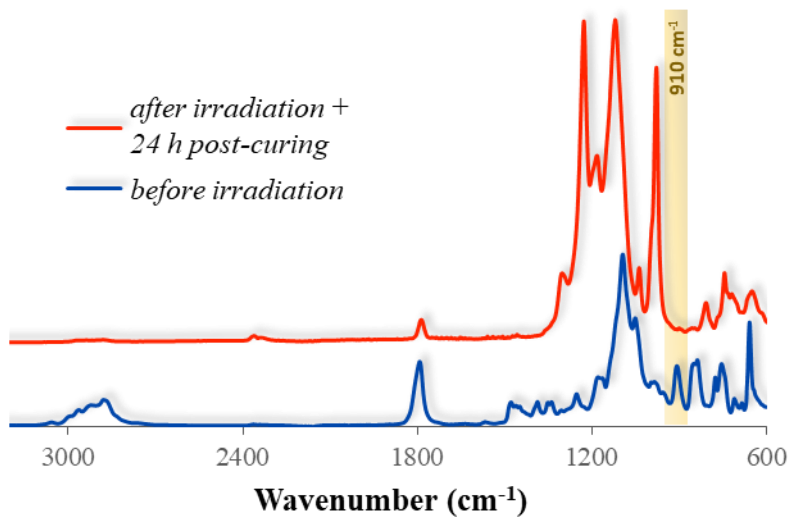


**Fig. S3** ATR FT-IR spectra of the PFPAE-DEGVE + TVE copolymer:

**R<sub>h</sub>**: peak  $\sim 1780\text{ cm}^{-1}$  C=O bond;  $\sim 1620\text{ cm}^{-1}$  C=C; peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers;

**R<sub>f</sub>**: peak  $\sim 1240\text{ cm}^{-1}$  stretching C-F bond, and peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers;

**Photoinitiator**: peak  $\sim 2950\text{ cm}^{-1}$  stretching C=C-H; peak  $\sim 1780\text{ cm}^{-1}$  C=O bond; peak  $\sim 1600\text{-}1320\text{ cm}^{-1}$  C<sub>6</sub>H<sub>6</sub> bonds; peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers

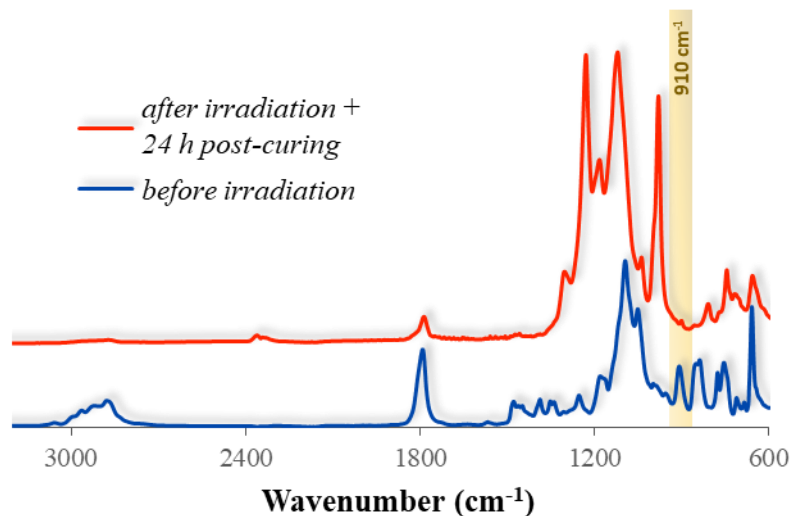


**Fig. S4** ATR FT-IR spectra of the PFPAE-MO + TGE copolymer:

**R<sub>h</sub>**: peak  $\sim 1780\text{ cm}^{-1}$  C=O bond;  $\sim 1620\text{ cm}^{-1}$  C=C; peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers; peak  $\sim 910\text{ cm}^{-1}$  epoxides;

**R<sub>f</sub>**: peak  $\sim 1240\text{ cm}^{-1}$  stretching C-F bond, and peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers;

**Photoinitiator**: peak  $\sim 2950\text{ cm}^{-1}$  stretching C=C-H; peak  $\sim 1780\text{ cm}^{-1}$  C=O bond; peak  $\sim 1600\text{-}1320\text{ cm}^{-1}$  C<sub>6</sub>H<sub>6</sub> bonds; peak  $\sim 1100\text{ cm}^{-1}$  C-O-C ethers

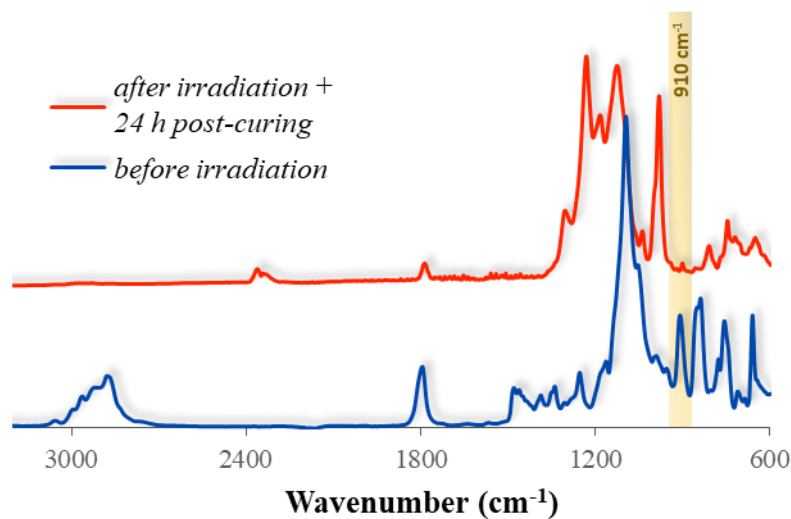


**Fig. S5** ATR FT-IR spectra of the PFPAE-EO + TGE copolymer:

**R<sub>h</sub>**: peak  $\sim 1780\text{ cm}^{-1}$  **C=O** bond;  $\sim 1620\text{ cm}^{-1}$  **C=C**; peak  $\sim 1100\text{ cm}^{-1}$  **C-O-C** ethers; peak  $\sim 910\text{ cm}^{-1}$  **epoxides**;

**R<sub>f</sub>**: peak  $\sim 1240\text{ cm}^{-1}$  stretching **C-F** bond, and peak  $\sim 1100\text{ cm}^{-1}$  **C-O-C** ethers;

**Photoinitiator**: peak  $\sim 2950\text{ cm}^{-1}$  stretching **C=C-H**; peak  $\sim 1780\text{ cm}^{-1}$  **C=O** bond; peak  $\sim 1600\text{-}1320\text{ cm}^{-1}$  **C<sub>6</sub>H<sub>6</sub>** bonds; peak  $\sim 1100\text{ cm}^{-1}$  **C-O-C** ethers



**Fig. S6** ATR FT-IR spectra of the PFPAE-PO + TGE copolymer:

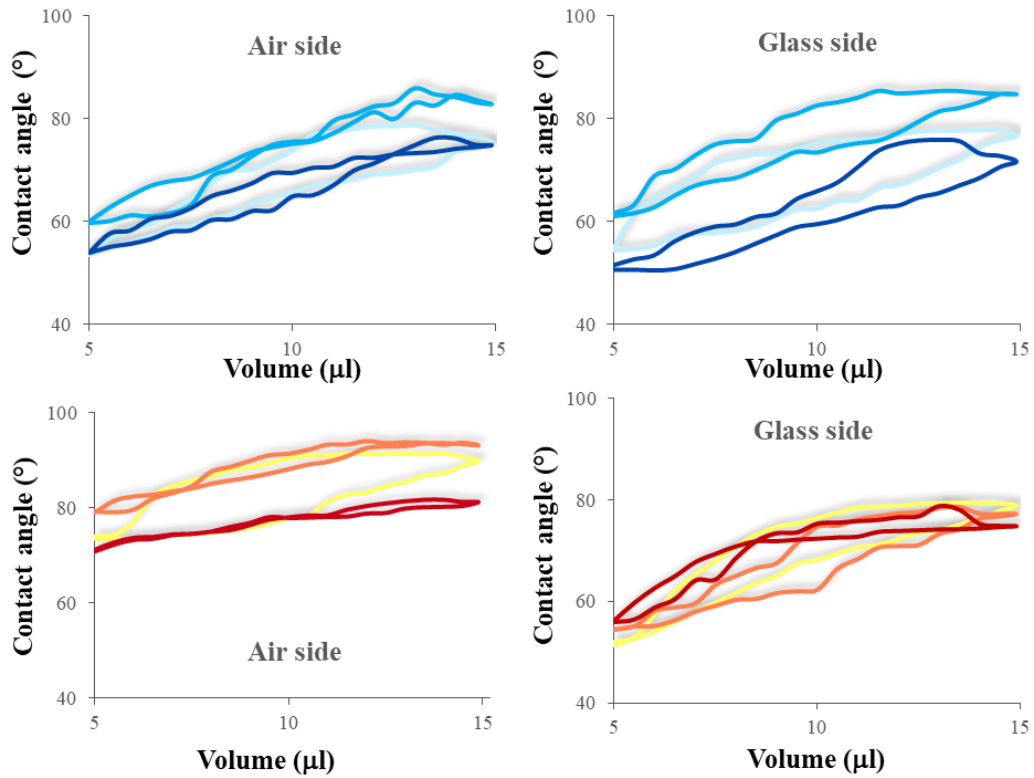
**R<sub>h</sub>**: peak  $\sim 1780\text{ cm}^{-1}$  **C=O** bond;  $\sim 1620\text{ cm}^{-1}$  **C=C**; peak  $\sim 1100\text{ cm}^{-1}$  **C-O-C** ethers; peak  $\sim 910\text{ cm}^{-1}$  **epoxides**;

**R<sub>f</sub>**: peak  $\sim 1240\text{ cm}^{-1}$  stretching **C-F** bond, and peak  $\sim 1100\text{ cm}^{-1}$  **C-O-C** ethers;

**Photoinitiator**: peak  $\sim 2950\text{ cm}^{-1}$  stretching **C=C-H**; peak  $\sim 1780\text{ cm}^{-1}$  **C=O** bond; peak  $\sim 1600\text{-}1320\text{ cm}^{-1}$  **C<sub>6</sub>H<sub>6</sub>** bonds; peak  $\sim 1100\text{ cm}^{-1}$  **C-O-C** ethers

**Table S1** Number of repeat units, average molecular weight ( $M_n$ ), difunctional content, (from  $^{19}\text{F}$ -NMR spectra) of the functionalized PFPAE monomers, and composition details and fluorine content of the investigated copolymers.

Copolymer	$m$	PFPAE molecular weight (g/mol)	PFPAE difunctional content (mol%)	PFPAE/Resin weight ratio	F content in copolymer (wt%)	F content in copolymer (mol%)
PFPAE-EGVE + TVE	6	1740	56	0.32	18.45	0.97
PFPAE-BGVE + TVE	8	2130	88	0.32	18.93	1.00
PFPAE-DEGVE + TVE	7	2000	43	0.32	16.46	0.87
PFPAE-MO + TGE	12	2720	63	0.32	17.06	0.90
PFPAE-EO + TGE	8	2130	41	0.32	16.06	0.85
PFPAE-PO + TGE	10	2530	58	0.32	16.08	0.85



**Fig. S7** Water contact angle hysteresis measurements, on air and glass sides, of the UV-cured copolymers:

— PFPAE-EGVE + TVE, — PFPAE-BGVE + TVE, — PFPAE-DEGVE + TVE,  
— PFPAE-MO + TGE, — PFPAE-EO + TGE, — PFPAE-PO + TGE.

**Table S2** Degradation temperatures of the UV-cured hydrogenated resins and copolymers

System	T <sub>onset</sub> (°C)	T <sub>max1</sub> (°C)	T <sub>max2</sub> (°C)	T <sub>90%</sub> (°C)
TVE	188	-	398	428
PFPAE-EGVE + TVE	137	181	397	427
PFPAE-BGVE + TVE	150	192	366	429
PFPAE-DEGVE + TVE	136	182	375	429
TGE	185	-	378	405
PFPAE-MO + TGE	130	156	381	413
PFPAE-EO + TGE	132	159	361	410
PFPAE-PO + TGE	140	159	385	413