Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Dual Functionalized Brush Copolymers as Versatile Antifouling Coatings

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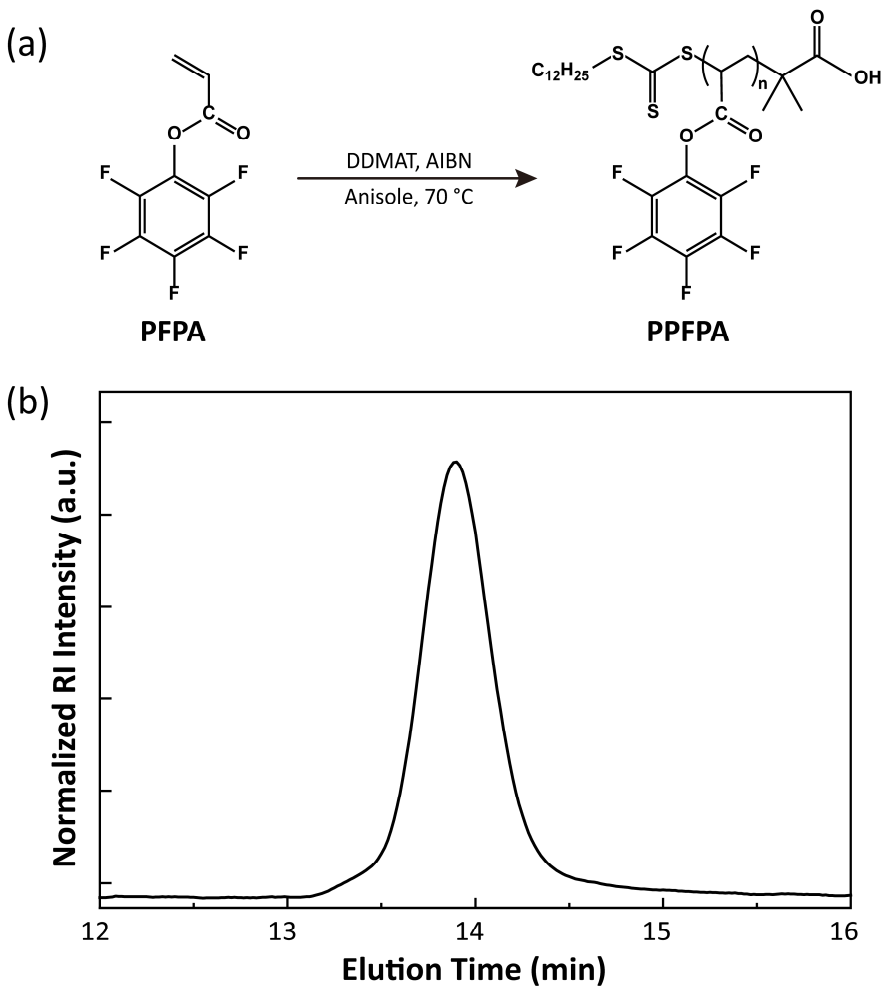

Fig. S1 (a) Synthesis scheme and (b) THF SEC elution profile of PPFPA precursor polymer.

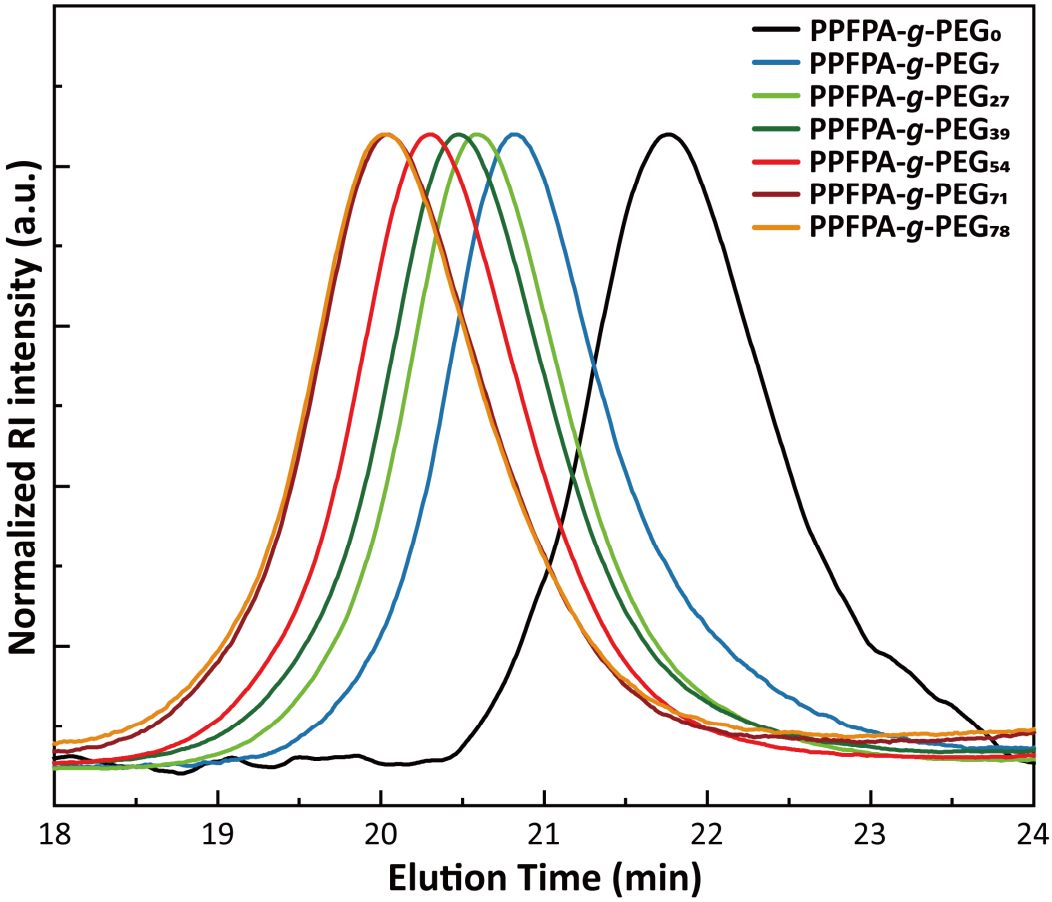

Fig. S2 DMF SEC elution profiles of PPFPA-*g*-PEG with different mol% of PEG side chain substitution.

Table S1 Copolymer Coating Thickness Analysis by Ellipsometry

Samples		Thickness (nm)		
Name	Code	APTES[a]	Total[a]	Copolymer[b]
PPFPA-*g*-PEG_0-*g*-$PDMS_{83}$	0-83	11.1 ± 0.9	15.1 ± 1.2	4.0
PPFPA-*g*-PEG_7-*g*-$PDMS_{73}$	7-73	19.9 ± 0.9	24.1 ± 1.5	4.2
PPFPA-*g*-PEG_{27}-*g*-$PDMS_{57}$	27-57	5.2 ± 1.0	11.0 ± 1.5	5.8
PPFPA-*g*-PEG_{39}-*g*-$PDMS_{46}$	39-46	4.2 ± 0.4	10.3 ± 1.0	6.1
PPFPA-*g*-PEG_{54}-*g*-$PDMS_{30}$	54-30	7.3 ± 1.1	13.7 ± 1.3	6.4
PPFPA-*g*-PEG_{71}-*g*-$PDMS_{12}$	71-12	12.3 ± 1.0	20.4 ± 1.2	8.1
PPFPA-*g*-PEG_{78}-*g*-$PDMS_0$	78-0	17.9 ± 0.9	26.1 ± 1.0	8.2

[a]Average thickness value obtained by measuring 5 different spots per sample. [b]Calculated by subtracting APTES thickness from total coating thickness.

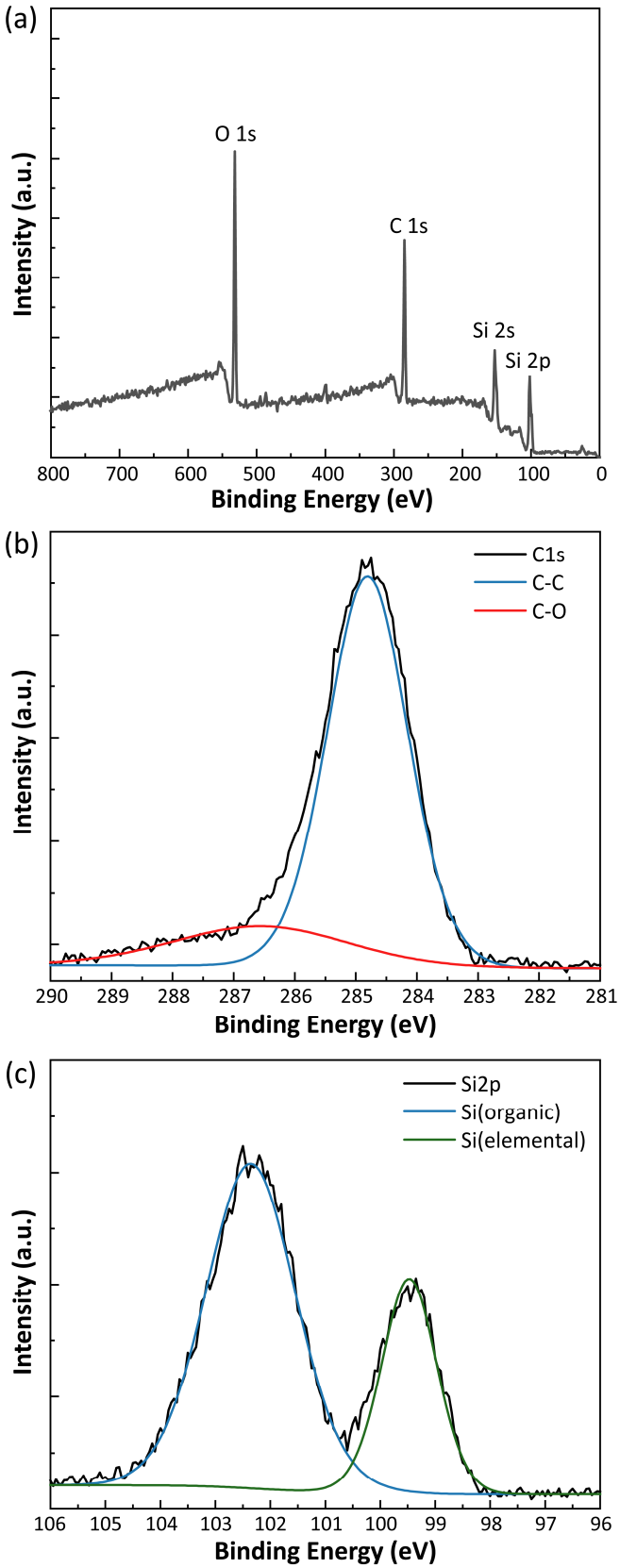

Fig. S3 XPS (a) survey spectrum and deconvoluted regions corresponding to (b) C1s and (c) Si2p for PPFPA-*g*-PEG_0-*g*-$PDMS_{83}$.

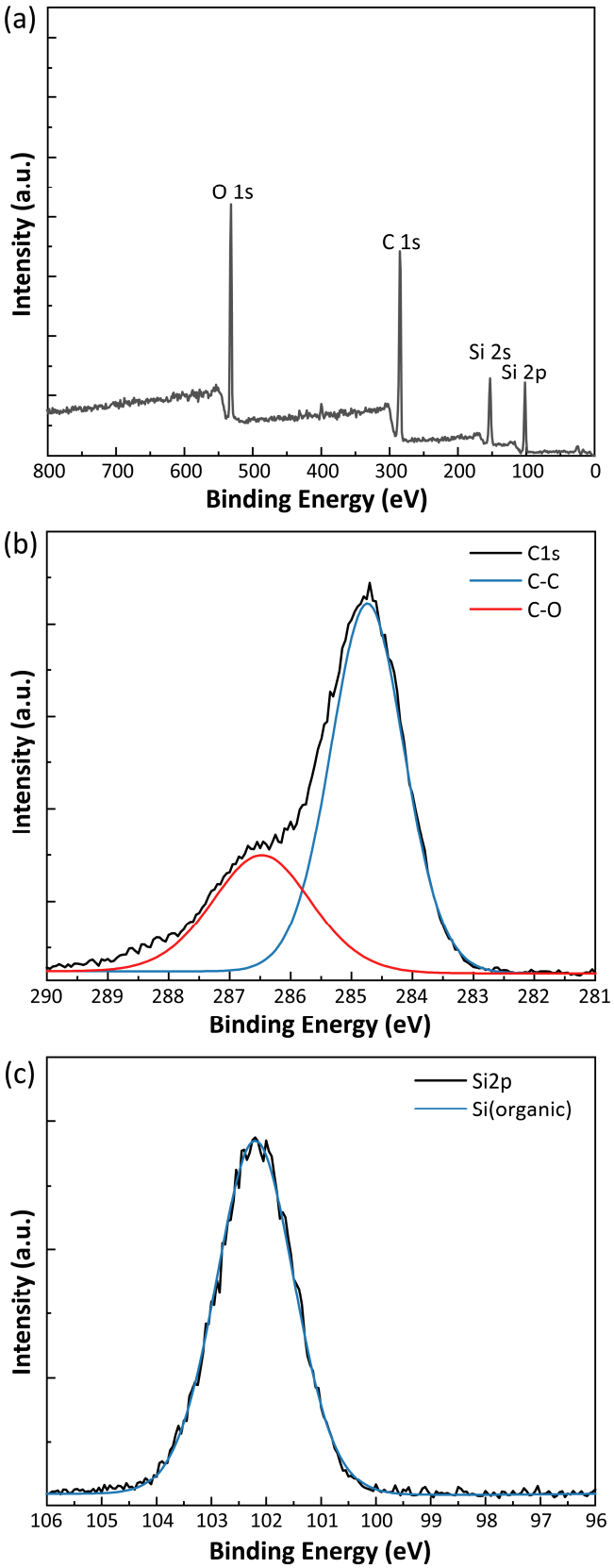

Fig. S4 XPS (a) survey spectrum and deconvoluted regions corresponding to (b) C1s and (c) Si2p for PPFPA-*g*-PEG$_7$-*g*-PDMS$_{73}$.

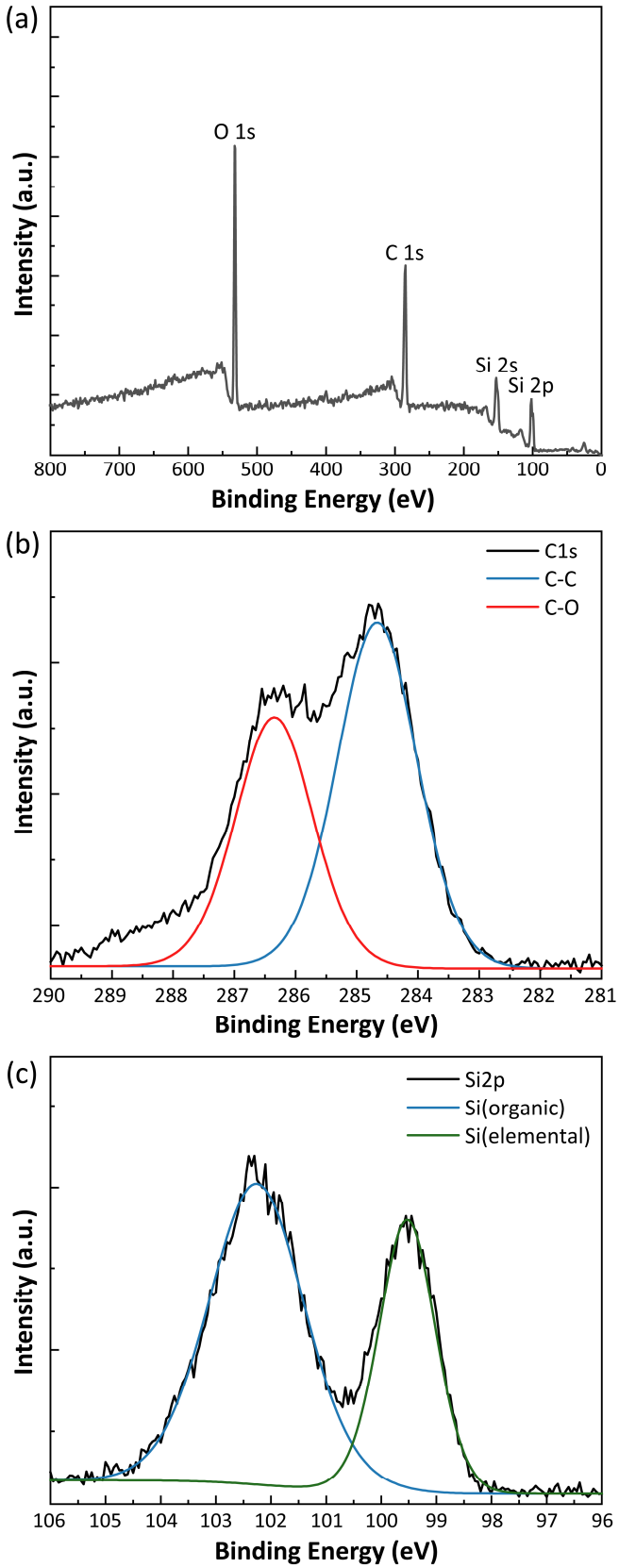

Fig. S5 XPS (a) survey spectrum and deconvoluted regions corresponding to (b) C1s and (c) Si2p for PPFPA-*g*-PEG_{27}-*g*-$PDMS_{57}$.

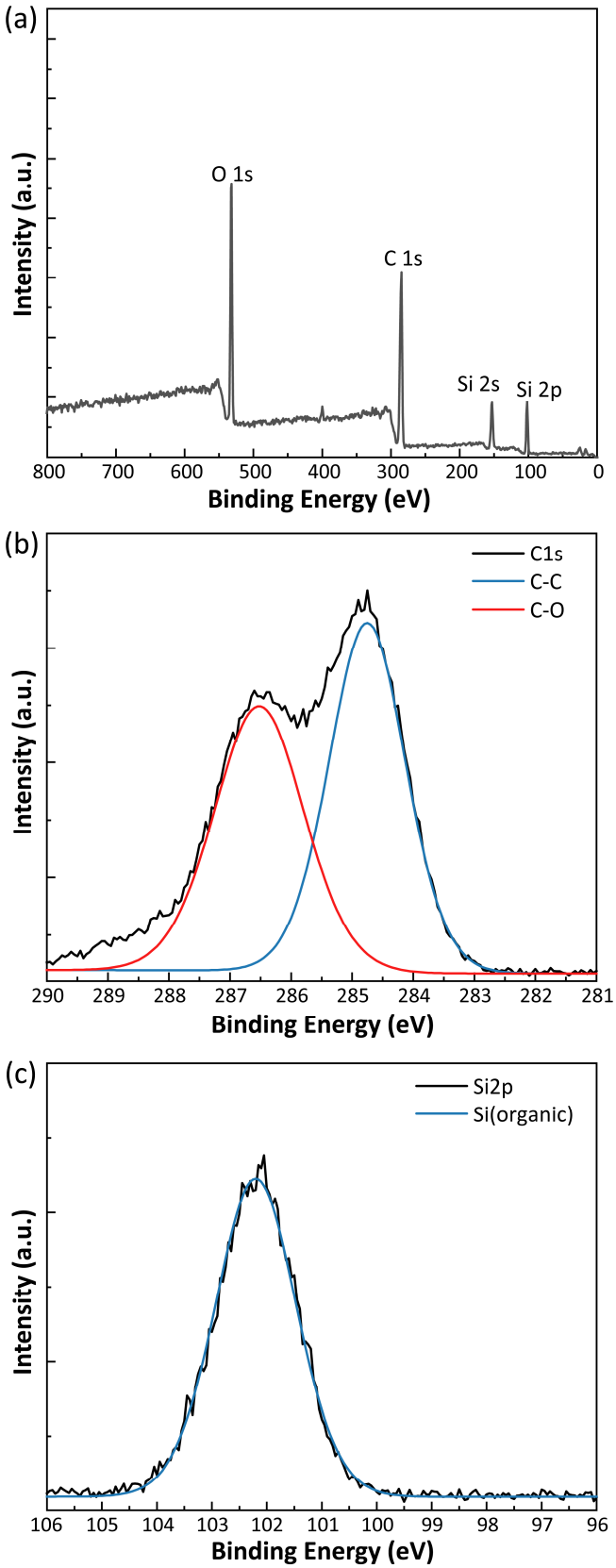

Fig. S6 XPS (a) survey spectrum and deconvoluted regions corresponding to (b) C1s and (c) Si2p for PPFPA-*g*-PEG$_{39}$-*g*-PDMS$_{46}$.

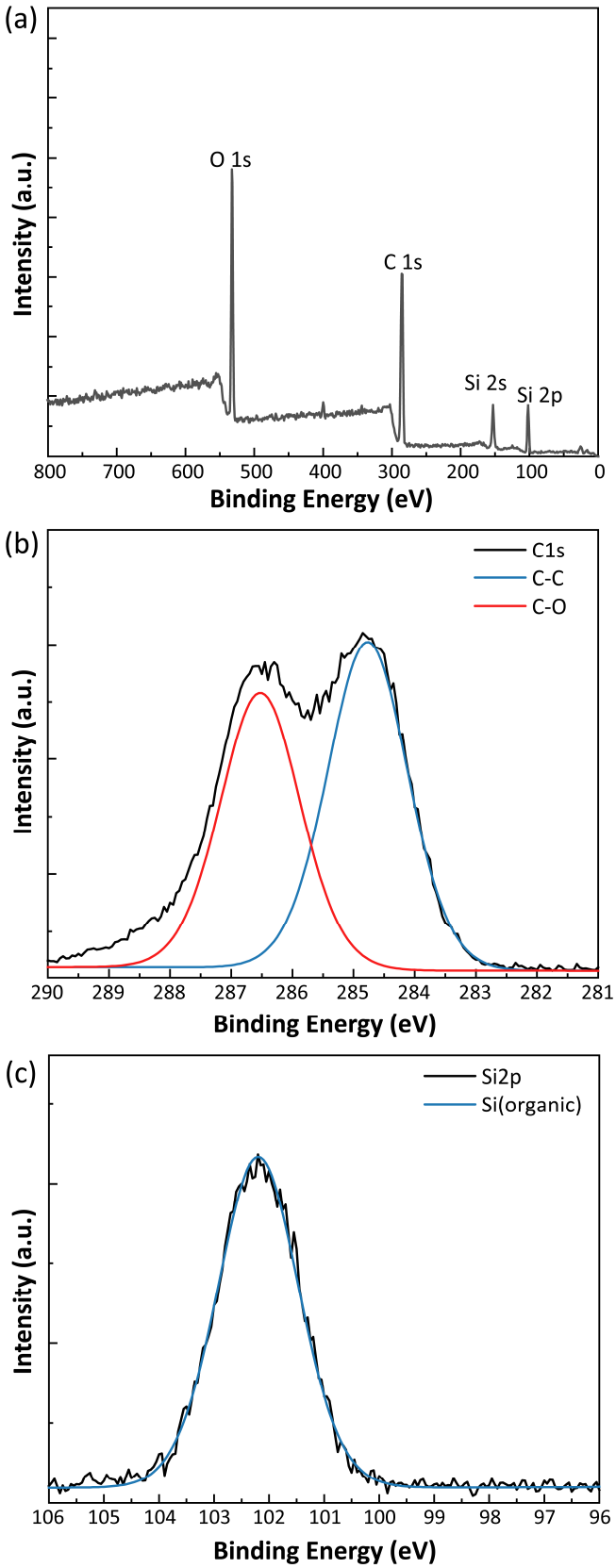

Fig. S7 XPS (a) survey spectrum and deconvoluted regions corresponding to (b) C1s and (c) Si2p for PPFPA-*g*-PEG$_{54}$-*g*-PDMS$_{30}$.

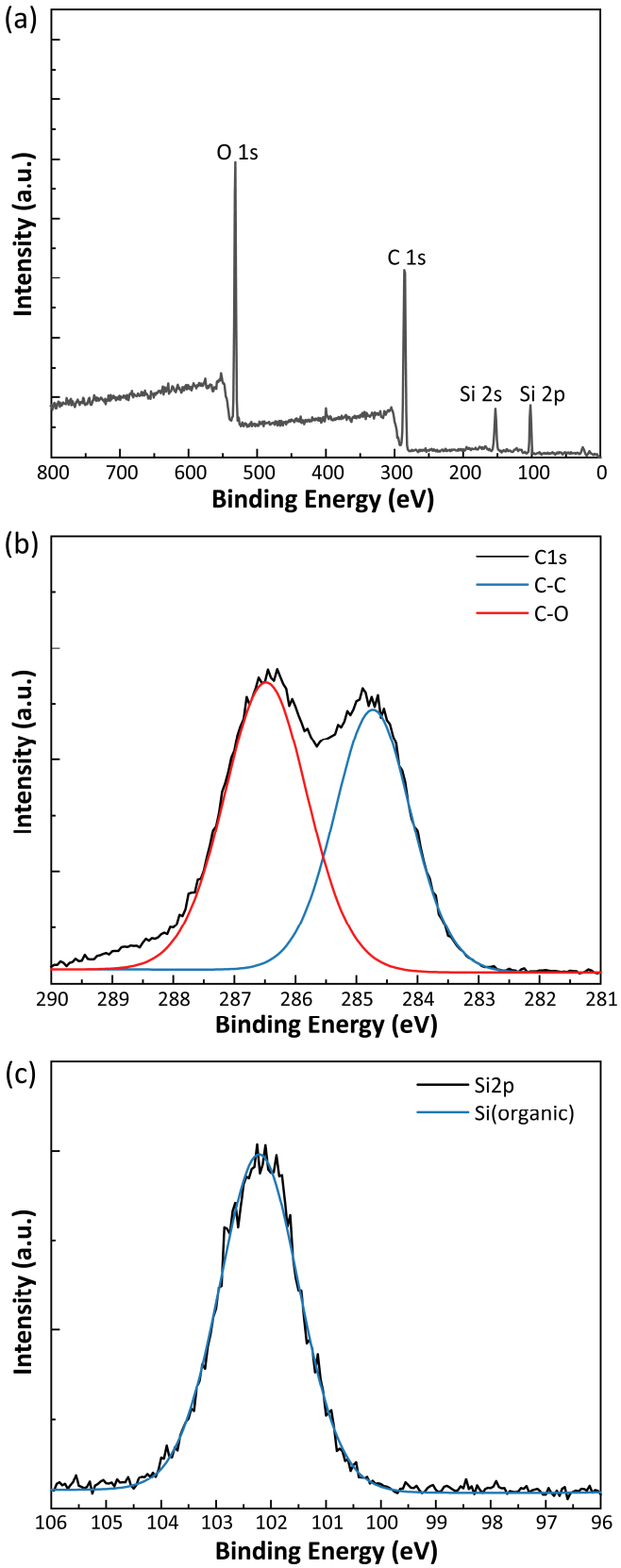

Fig. S8 XPS (a) survey spectrum and deconvoluted regions corresponding to (b) C1s and (c) Si2p for PPFPA-*g*-PEG$_{71}$-*g*-PDMS$_{12}$.

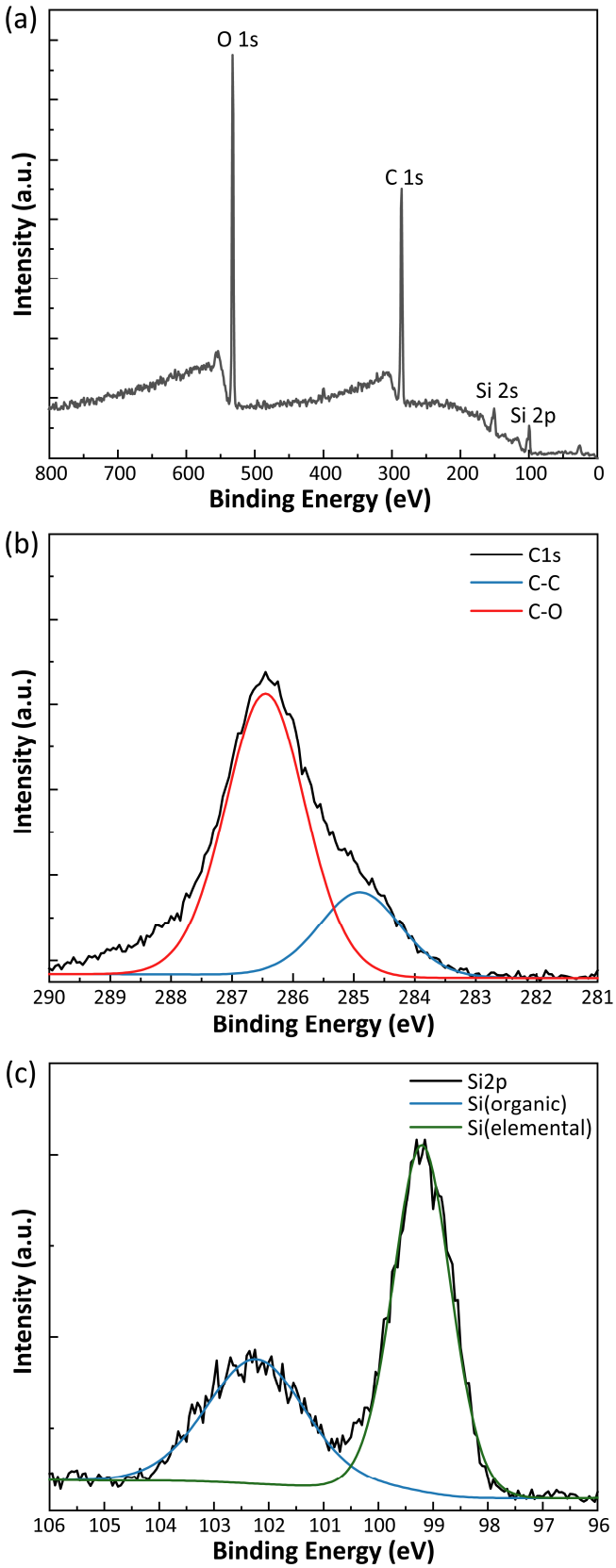

Fig. S9 XPS (a) survey spectrum and deconvoluted regions corresponding to (b) C1s and (c) Si2p for PPFPA-*g*-PEG_{78}-*g*-$PDMS_0$.

Table S2 Surface Elemental Analysis of PPFPA-*g*-PEG-*g*-PDMS Coatings

Samples		C-O (Atomic %)		Si(organic) (Atomic %)*	
Name	Code	Theo.	Exp.	Theo.	Exp.
PPFPA-*g*-PEG_0-*g*-$PDMS_{83}$	0-83	1.7	8.7	22.3	22.8
PPFPA-*g*-PEG_7-*g*-$PDMS_{73}$	7-73	4.9	18.2	20.0	18.4
PPFPA-*g*-PEG_{27}-*g*-$PDMS_{57}$	27-57	13.2	24.4	14.4	15.5
PPFPA-*g*-PEG_{39}-*g*-$PDMS_{46}$	39-46	17.8	28.7	11.3	14.1
PPFPA-*g*-PEG_{54}-*g*-$PDMS_{30}$	54-30	23.6	29.6	7.2	13.4
PPFPA-*g*-PEG_{71}-*g*-$PDMS_{12}$	71-12	30.0	33.1	2.8	12.1
PPFPA-*g*-PEG_{78}-*g*-$PDMS_0$	78-0	34.0	46.0	0	5.7

*****Note Si(organic) for low PDMS substituted samples show higher experimentally measured percentage values due to contributions from APTES linkers.

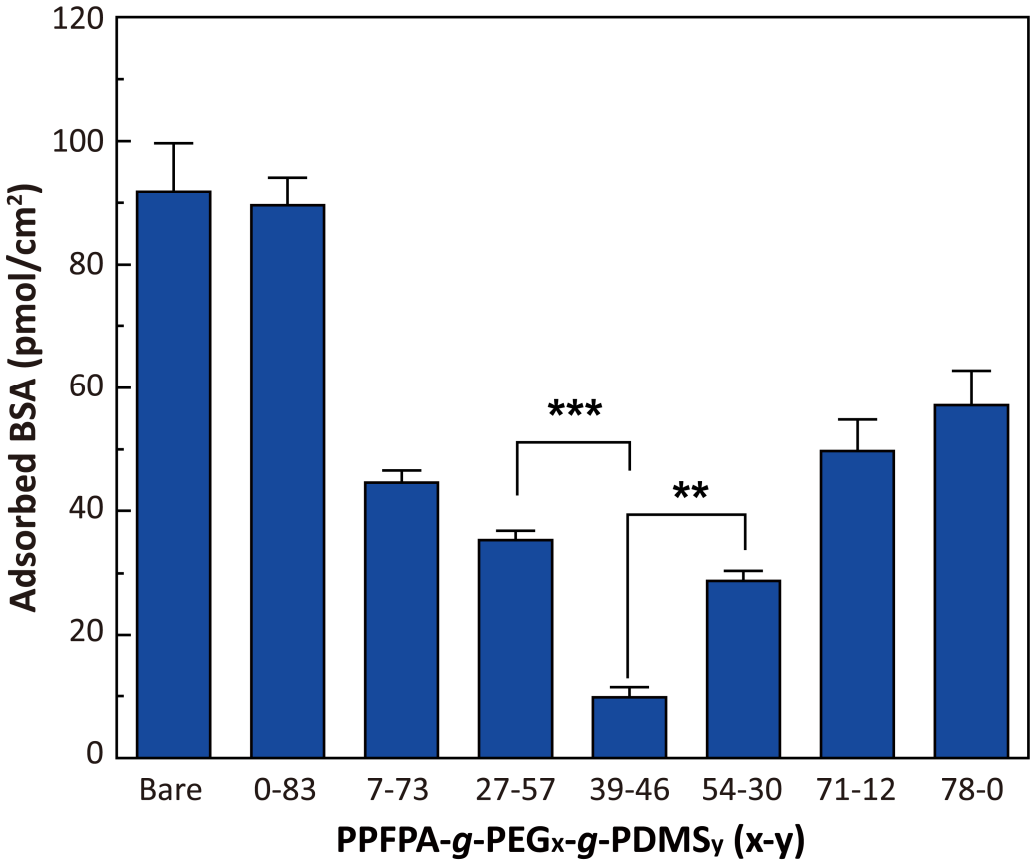

Fig. S10 Quantified average numbers of BSA adsorbed on bare Si surface and PPFPA-*g*-PEG-*g*-PDMS copolymer-coated Si surfaces (*n* = 3, and the error bars denote standard deviation). ** and *** represent *p*-values less than 0.01 and 0.001, respectively.

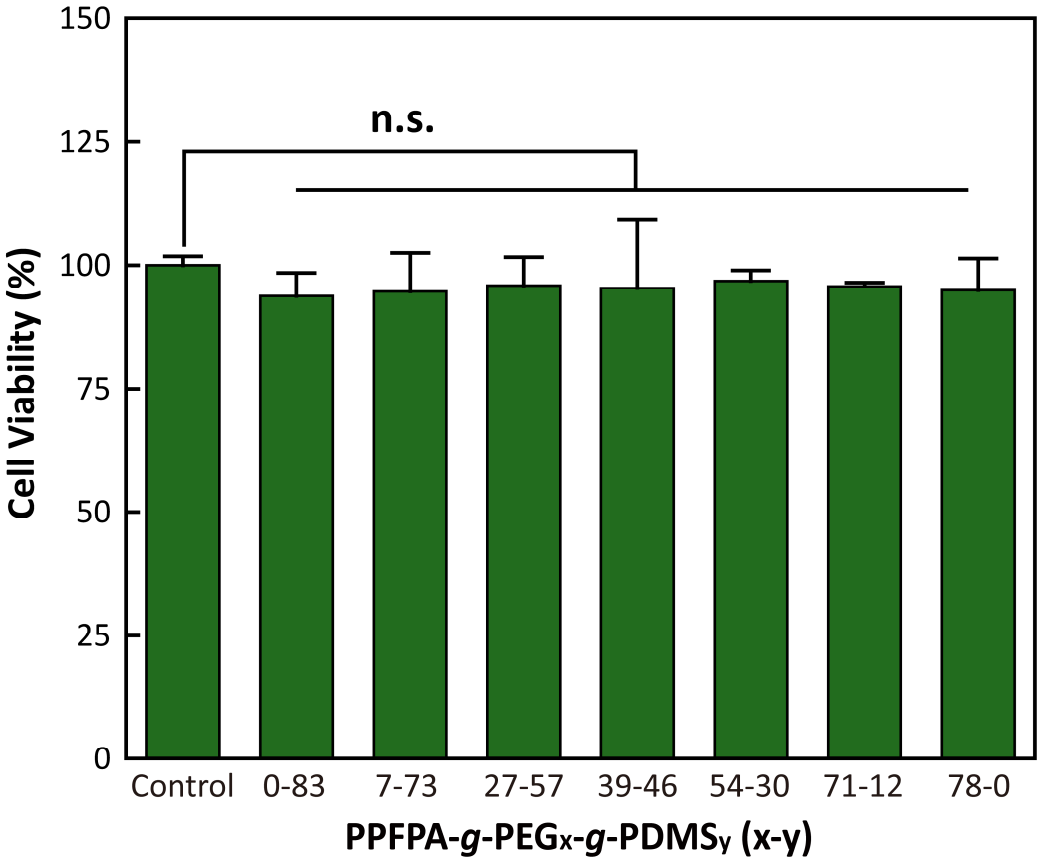

Fig. S11 Cytotoxicity of the PPFPA-*g*-PEG-*g*-PDMS copolymers against A549 cells (n = 5, and the error bars denote standard deviation). Control represents A549 cells without polymer addition. n.s. represents non-significant.

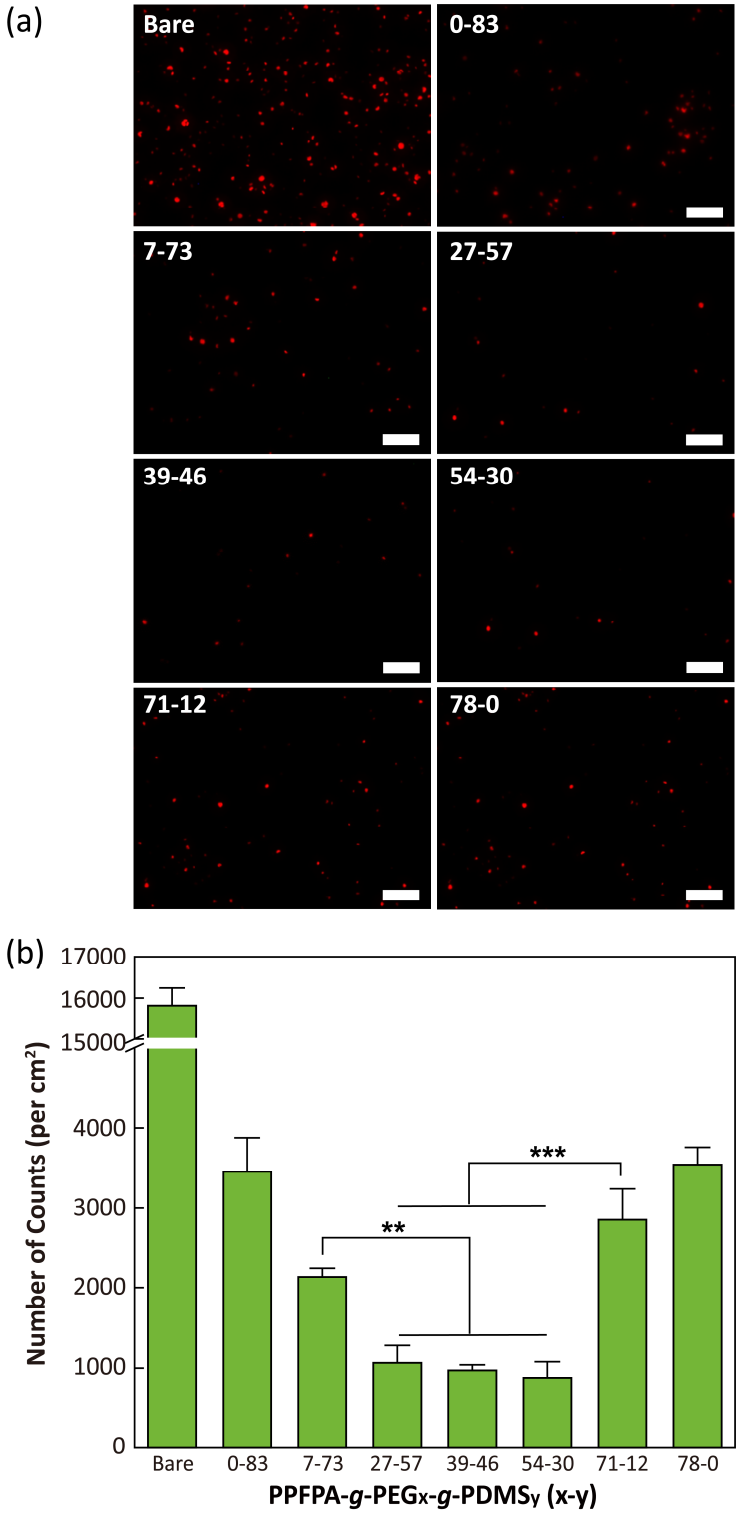

Fig. S12 (a) Fluorescence microscopy images of *C. vulgaris* settled on bare Si surface and PPFPA-*g*-PEG-*g*-PDMS copolymer-coated Si surfaces after 3 days (scale bar: 20 μm). (b) Quantified average numbers of attached *C. vulgaris* (*n* = 3, and the error bars denote standard deviation). ** indicates a *p*-value of 0.01. *** indicates a *p*-value of 0.001.

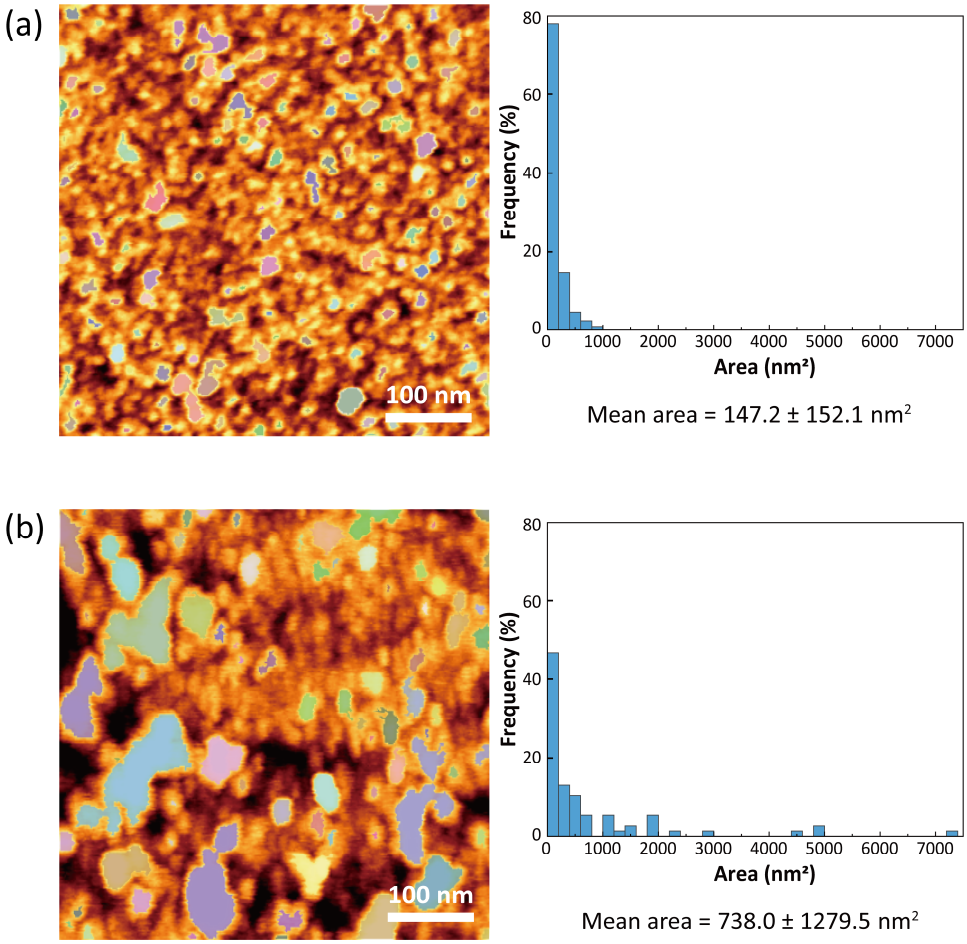

Fig. S13 AFM measured surface domain size analysis for (a) PPFPA-*g*-PEG$_{39}$-*g*-PDMS$_{46}$ and (b) PPFPA-*g*-PEG$_{54}$-*g*-PDMS$_{30}$. For each sample, its height image is analyzed to color-mark all regions with heights above a threshold value of 0.5 nm. The domain sizes of the color-marked regions are then calculated using Park systems XEI software, with the results summarized in the histogram.