Supporting Information for:

Critical Domain Sizes of Heterogeneous Nanopattern Surfaces with Optimal Protein Resistance

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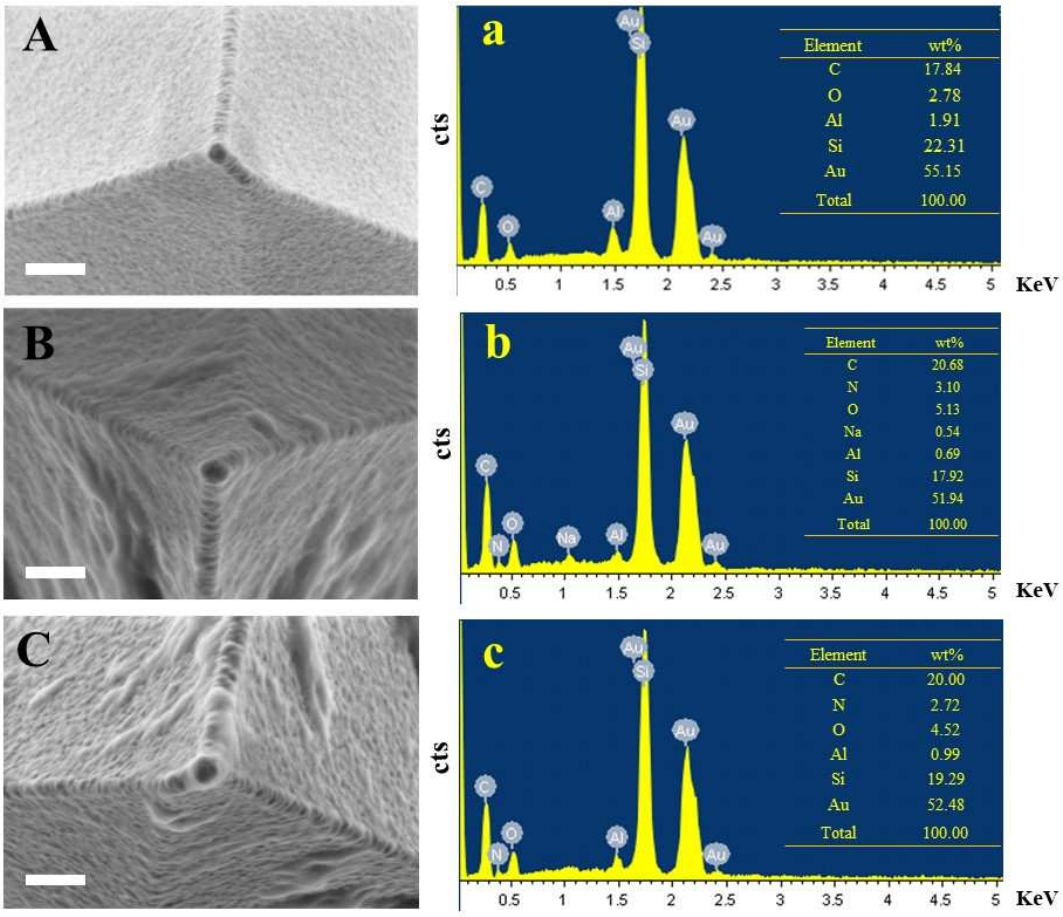

Figure S1. Representative SEM and EDS results of gold coated tip (A, a), proteins functionalized tip (B, b), and proteins functionalized tip after being used in force measurement (C, c). Scale bar: 200 nm.

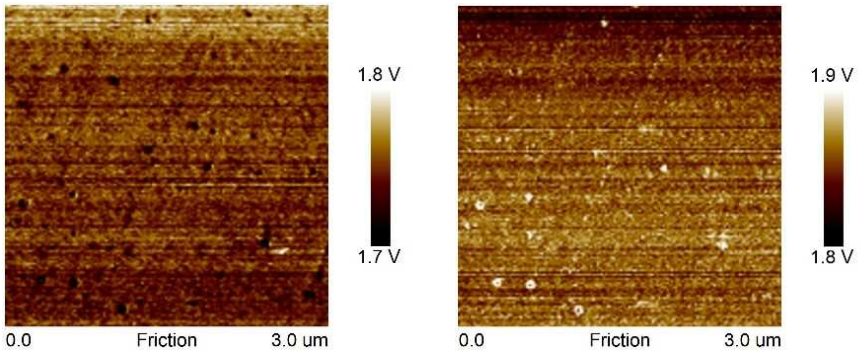

Figure S2. The representative lateral force trace (left) and retrace (right) maps of $mPEG_{110}$-V-$PMMA_{82}$-*b*-$PFMA_5$ V-shaped brush.

As we all know, friction coefficient (μ) can be calculated as the specific value of the friction force ($F_{friction}$) and load force (F_{load}). In the measurement of AFM, $F_{friction}$ and F_{load} are converted from voltage, and μ can be obtained through the relations as follows:

$$\mu = \frac{F_{friction}}{F_{load}} = \frac{k_1 V_{friction}}{k_2 V_{load}}$$

Where $V_{friction}$ is friction induced voltage, V_{load} is load voltage (2 V was used in our work), k_1 and k_2 are two constants, which are related to lateral sensitivity and lateral force constant, normal sensitivity and normal force constant, respectively. Because Bruker MultiMode-8 instrument does not provide a way to calibrate lateral sensitivity and lateral force constant of a cantilever, the absolute value of friction coefficient can't be obtained. And the relative friction coefficient is calculated through the equation as follows:

$$\mu_{relative} = \frac{k_2}{k_1}\mu = \frac{V_{friction}}{V_{load}}$$

$V_{friction}$ is calculated as half of the difference value between the two friction images ($V_{friction} = (V_{trace}-V_{retrace})/2$), as shown in Figure S2. (According to the data of Figure S2, $V_{friction} = (1.885-1.705)/2 = 0.09$, $\mu_{relative} = 0.045$)

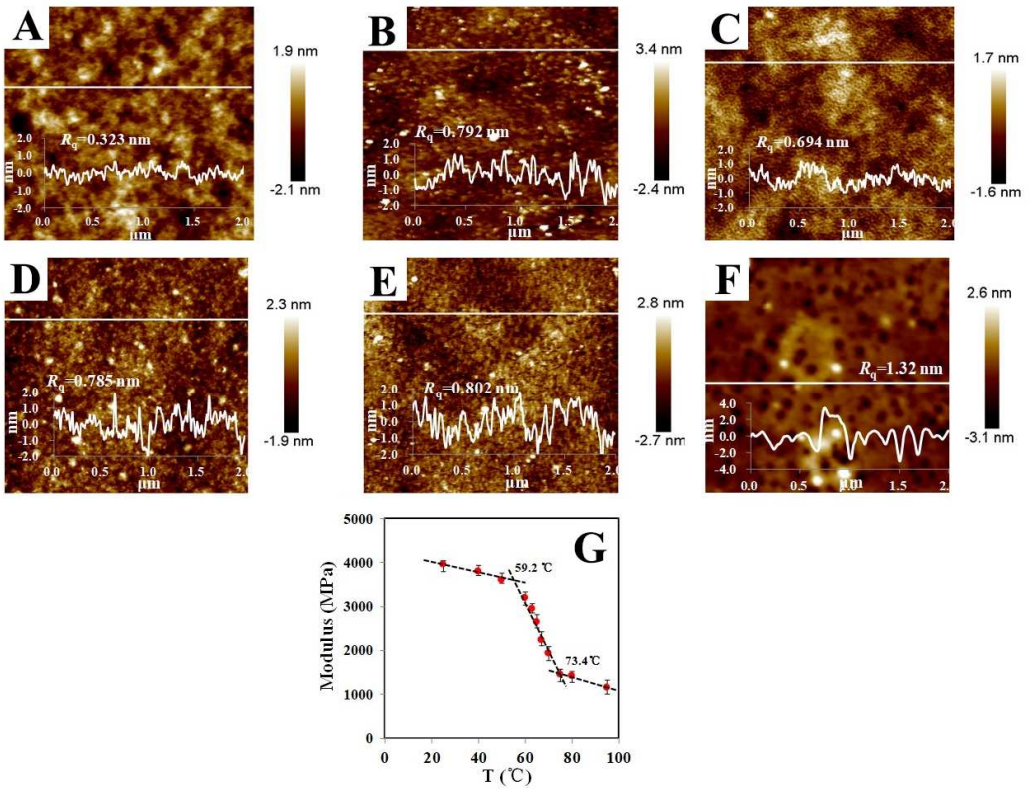

Figure S3. AFM height images (2.0 μm × 2.0 μm) of $mPEG_{110}$-V-$PMMA_n$-*b*-$PFMA_5$ brushes. (A-F) n = 30, 64, 82, 93, 109 and 128, respectively. (G) Modulus vs temperature for bright domain obtained by AFM PeakForce QNM mode.

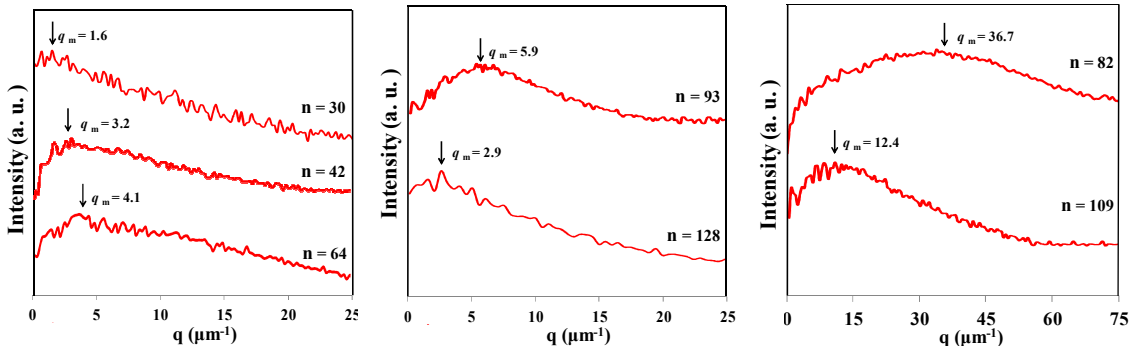

Figure S4. Power spectrum obtained by circular average of FT AFM images of V-shaped brushes $mPEG_{110}$-V-$PMMA_n$-*b*-$PFMA_5$ in **Figure 2**.

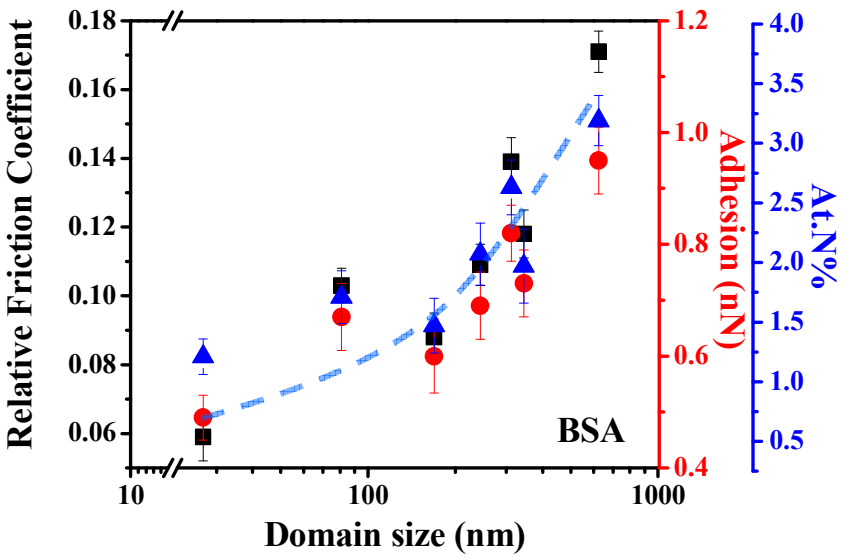

Figure S5. Atomic % N_{1s} of adsorbed protein, average measured adhesion force and the relative friction coefficient of BSA versus domain sizes in $mPEG_{110}$-V-$PMMA_n$-*b*-$PFMA_5$ brushes.

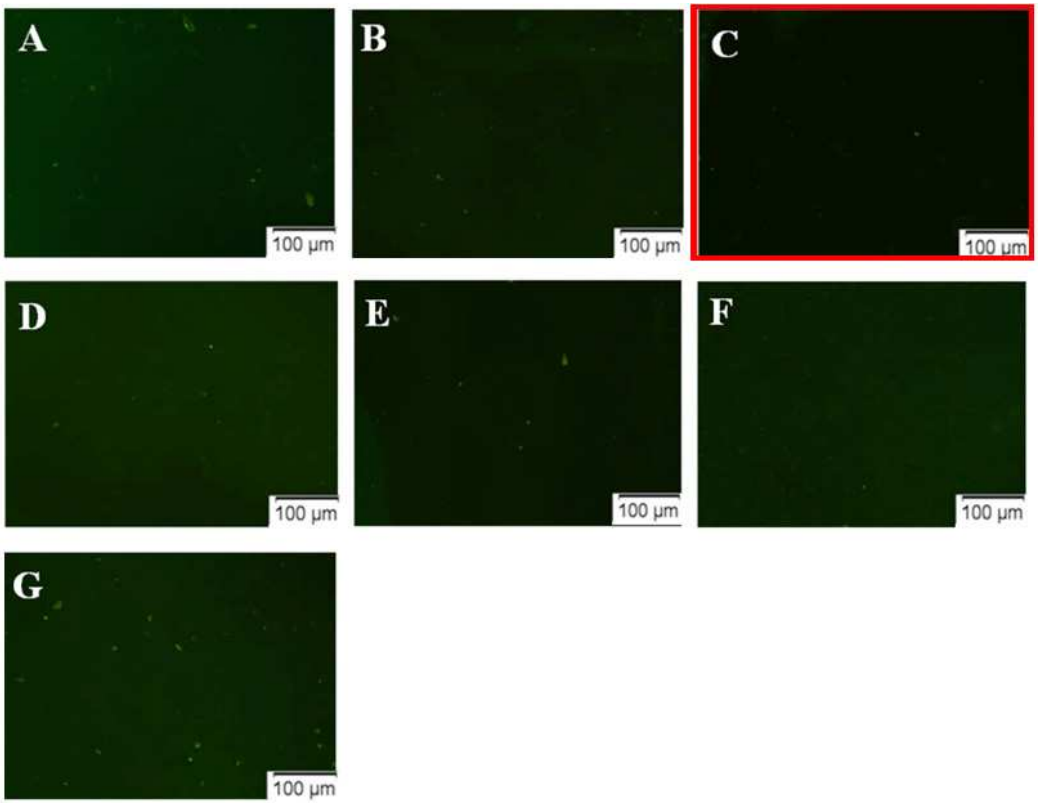

Figure S6. Fluorescence microscopy images of V-shaped polymer brushes with two arms of mPEG and PS after FITC-BSA adsorption. (A) $mPEG_{42}$-V-PS_{43}, (B) $mPEG_{42}$-V-PS_{78}, (C) $mPEG_{42}$-V-PS_{128}, (D) $mPEG_{110}$-V-PS_{61}, (E) $mPEG_{110}$-V-PS_{119}, (F) $mPEG_{110}$-V-PS_{169}, (G) $mPEG_{110}$-V-PS_{227}.

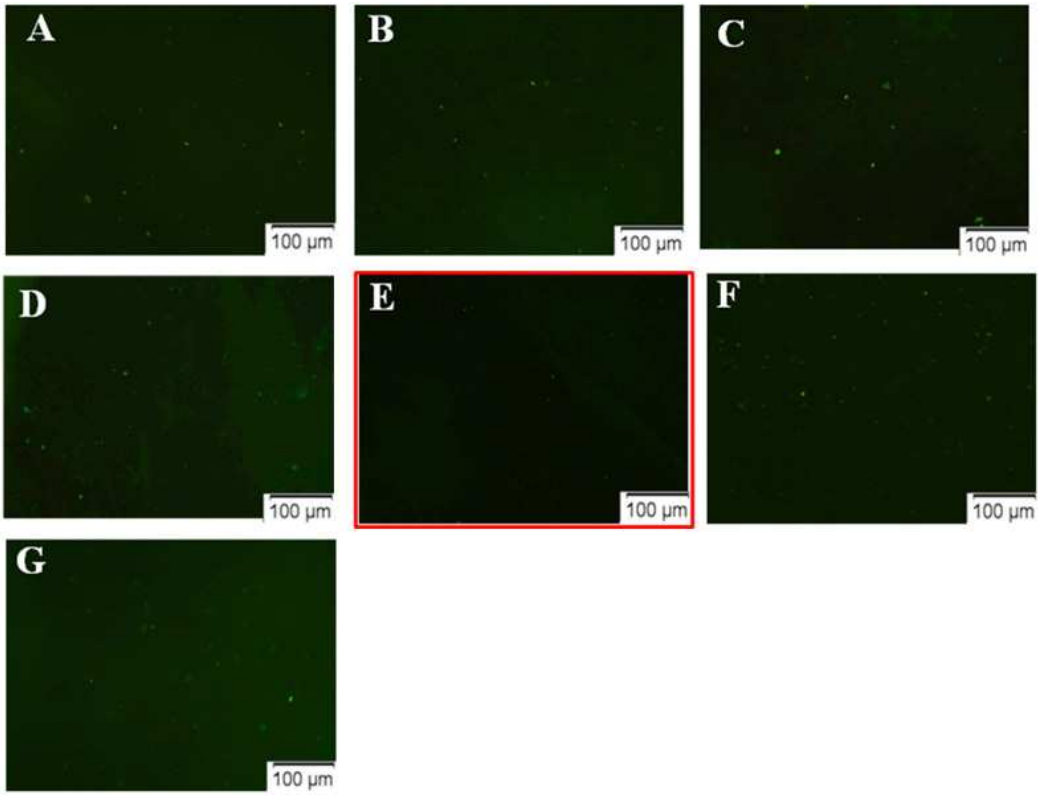

Figure S7. Fluorescence microscopy images of V-shaped polymer brushes with two arms of mPEG and PS after FITC-HFg adsorption. (A) $mPEG_{42}$-V-PS_{43}, (B) $mPEG_{42}$-V-PS_{78}, (C) $mPEG_{42}$-V-PS_{128}, (D) $mPEG_{110}$-V-PS_{61}, (E) $mPEG_{110}$-V-PS_{119}, (F) $mPEG_{110}$-V-PS_{169}, (G) $mPEG_{110}$-V-PS_{227}.

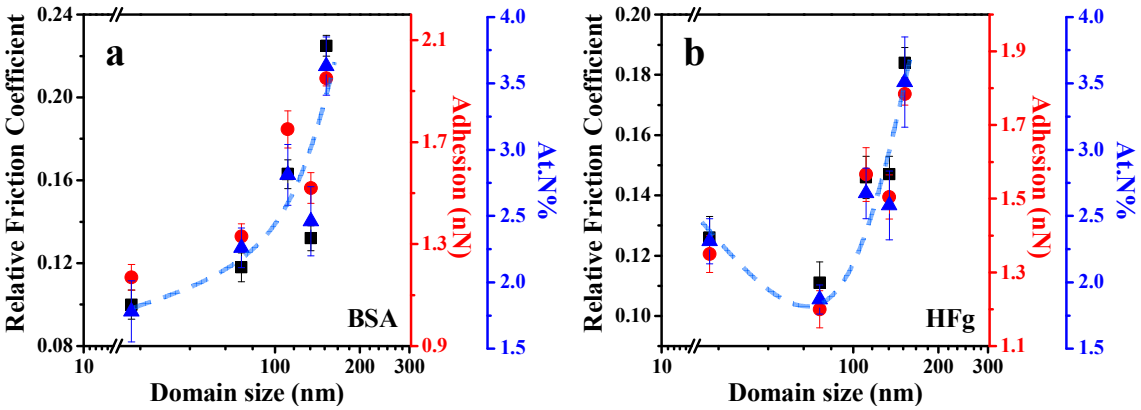

Figure S8. Atomic % N_{1s} of adsorbed protein, average measured adhesion force and the relative friction coefficient of BSA (a) and HFg (b) versus domain sizes in mPEG-V-PS brushes.

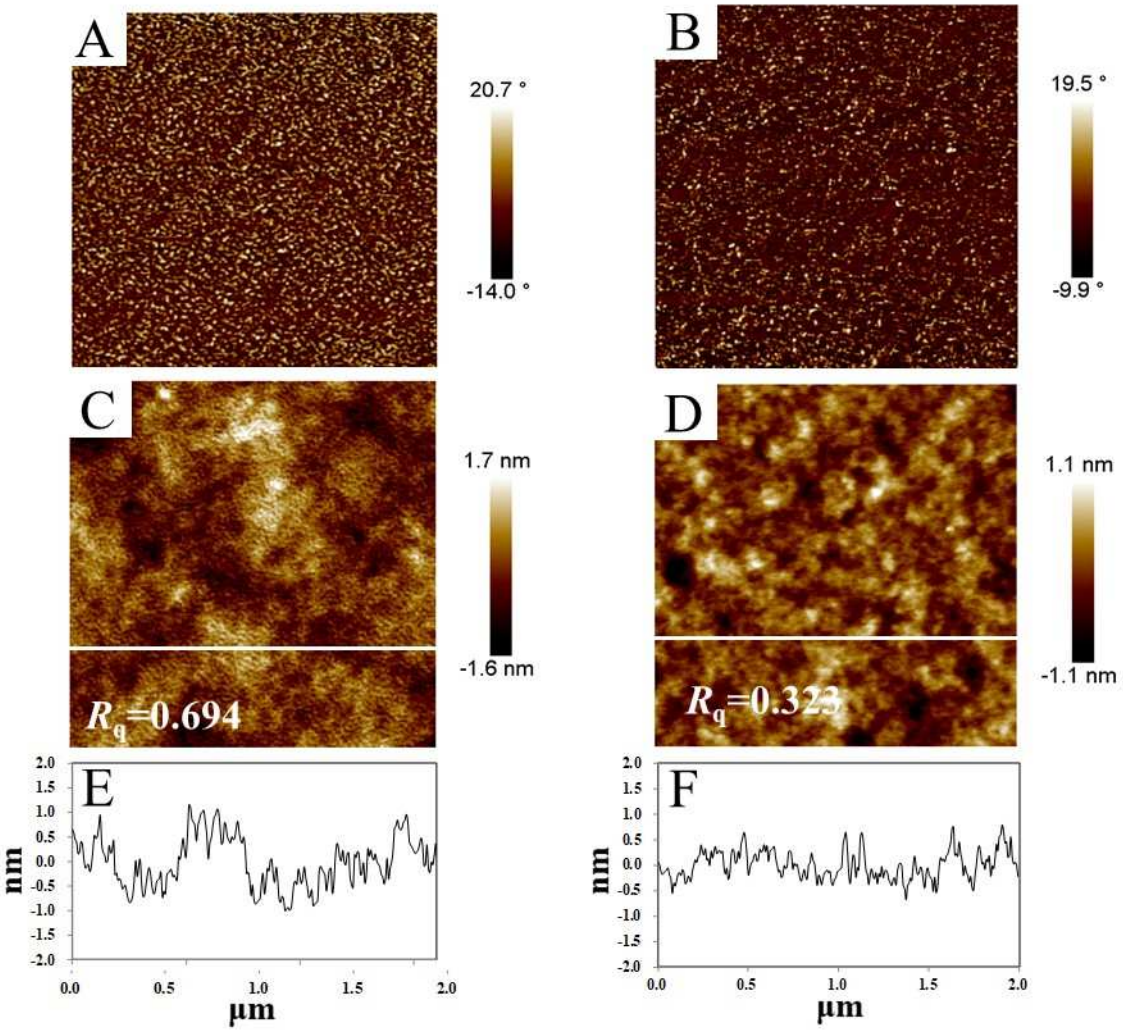

Figure S9. AFM phase images, height images and height profiles of $mPEG_{110}$-V-$PMMA_{82}$-*b*-$PFMA_5$ brushes in air (A, C, E) and in PBS solutions (B, D, F), respectively.

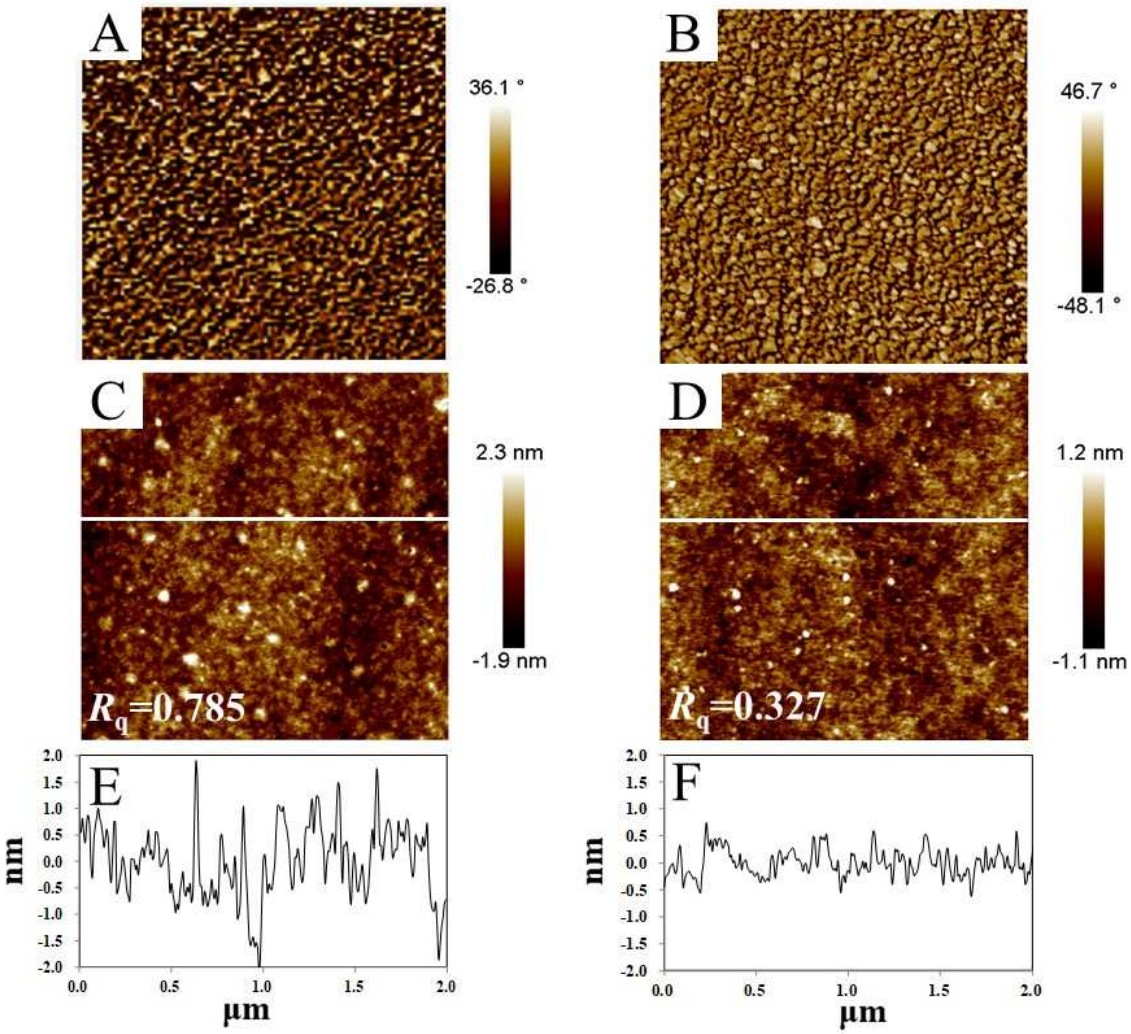

Figure S10. AFM phase images, height images and height profiles of $mPEG_{110}$-V-$PMMA_{109}$-*b*-$PFMA_5$ brushes in air (A, C, E) and in PBS solutions (B, D, F), respectively.