Supporting Information

Protein resistant properties of polymers with different branched architecture on a gold surface

Yuanyuan Zhuang,[a] *Qi Zhu,*[*a] *Chunlai Tu,*[a] *Dali Wang,*[a] *Jieli Wu,*[b] *Yumin Xia,*[c] *Gangsheng Tong,*[b] *Lin He,*[*b] *Bangshang Zhu,*[b] *Deyue Yan,*[a] *and Xinyuan Zhu*[*ab]

[a] School of Chemistry and Chemical Engineering, State Key Laboratory of Metal Matrix Composites, Shanghai Jiao Tong University, 800 Dongchuan Road, Shanghai 200240, P. R. China

[b] Instrumental Analysis Center, Shanghai Jiao Tong University, 800 Dongchuan Road, Shanghai 200240, P. R. China

[c] College of Materials Science and Engineering, Donghua University, 2999 North Renmin Road, Shanghai 201620, P. R. China

* To whom correspondence should be addressed. xyzhu@sjtu.edu.cn; firstzq@sjtu.edu.cn; lhe@sjtu.edu.cn. Tel.: +86-21-34205699. Fax: +86-21-34205722.

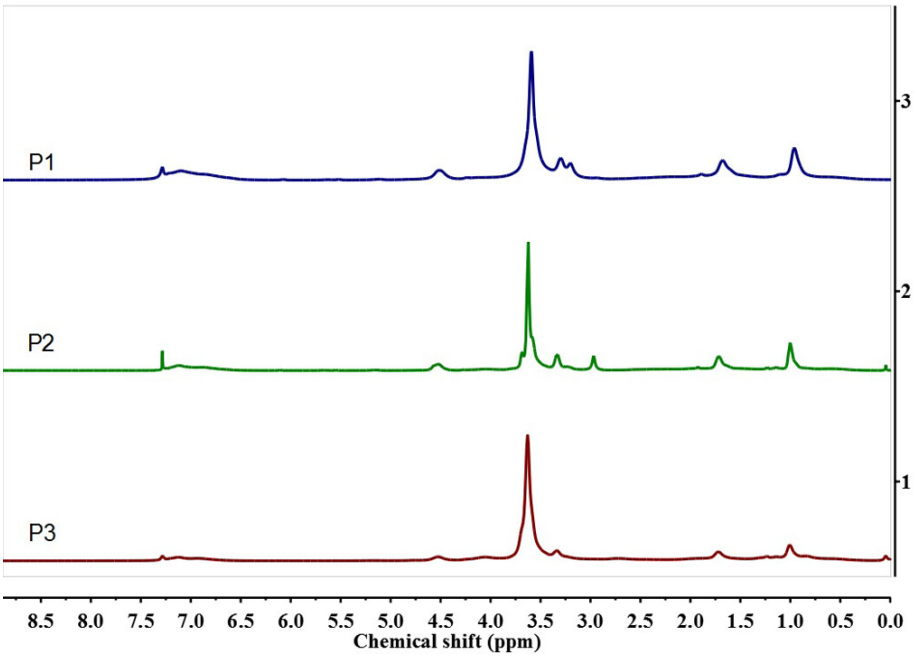

Fig. S1. ^{1}H NMR spectra of branched poly(VBPT-*co*-PEGMA) P1, P2 and P3.

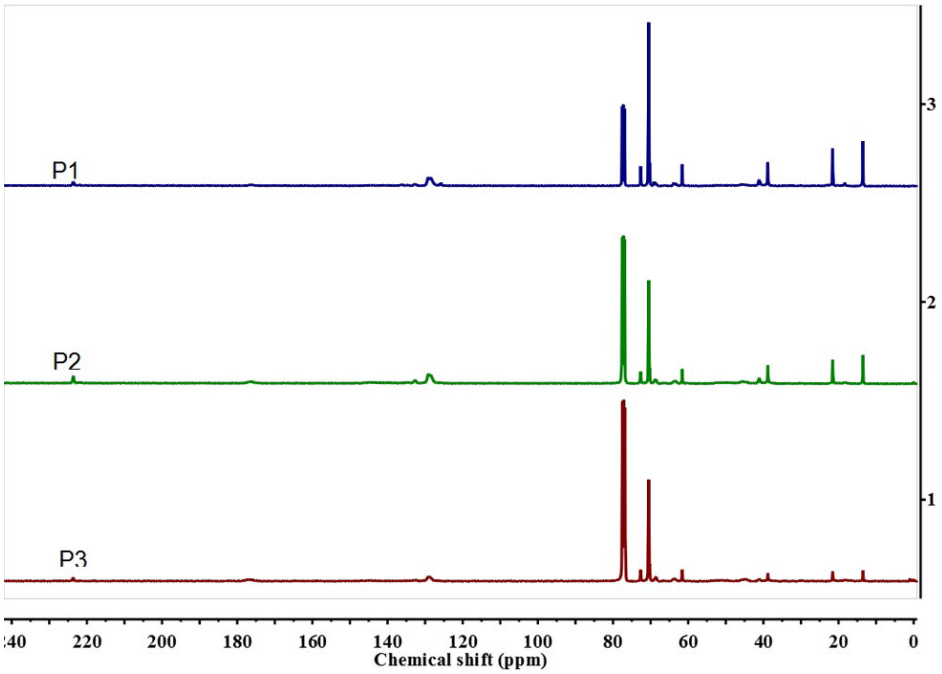

Fig. S2. Quantitative ^{13}C NMR spectra of branched poly(VBPT-*co*-PEGMA) P1, P2 and P3.

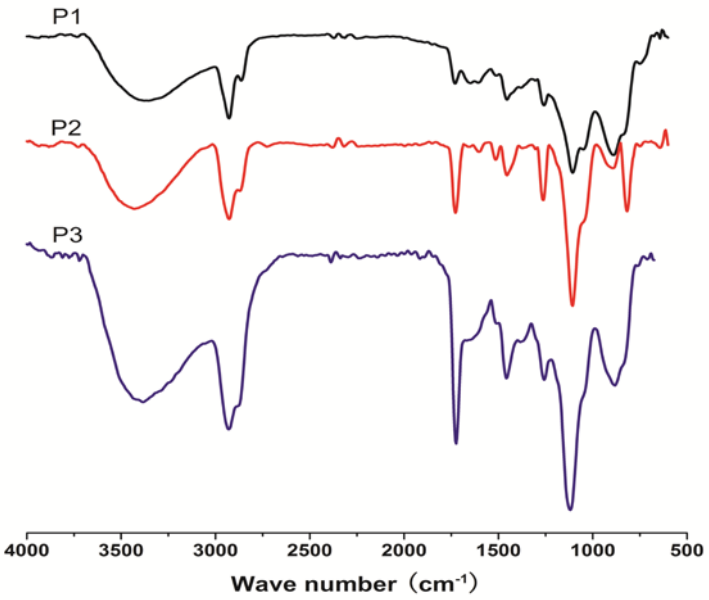

Fig. S3. ATR-FTIR spectra of branched poly(VBPT-*co*-PEGMA) P1-, P2- and P3-coated gold surfaces.

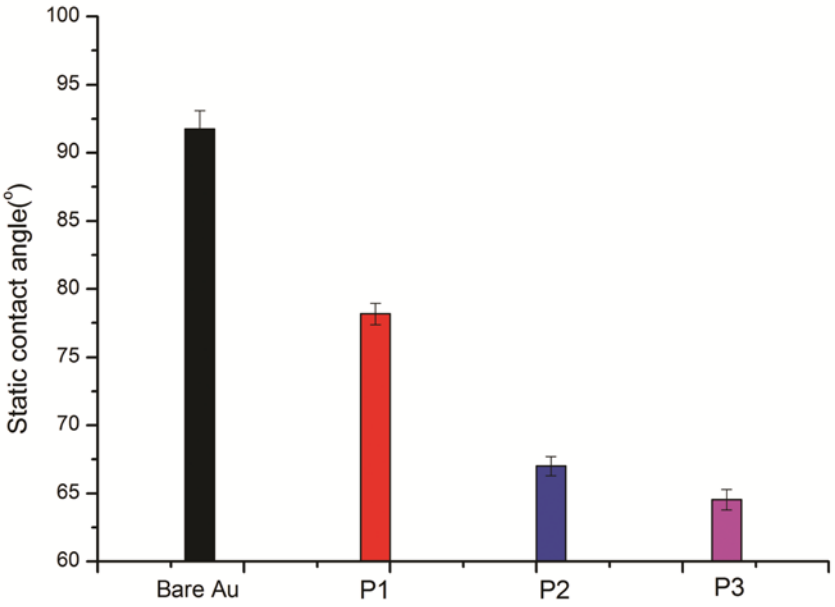

Fig. S4. Static contact angles of bare Au, Au-P1, Au-P2, and Au-P3.

Preparation of linear PEGMA-coated gold surface

RAFT agent cumyl dithiobenzoate (CDB) was synthesized according to the literature procedure.[1] Linear PEGMA was synthesized by RAFT polymerization. PEGMA (~360 g/mol), CDB and AIBN were added to a round bottom flask with a magnetic stirring bar, and toluene was added as solvent ([PEGMA]:[CDB]:[AIBN] = 30:1:0.1). The flask was sealed with a rubber septum, and then the solution was bubbled with nitrogen for 30 min. Subsequently, the flask was immersed into a 60 °C oil-bath. After reacting for 6 h under nitrogen atmosphere, the solution was quenched by an ice-water bath. The linear PEGMA was obtained by precipitation into cold diethyl ether for three times. The product was purified by filtration and dried in vacuum. Linear PEGMA: Mn=8.8 × 10^3, PDI=1.40. The linear PEGMA-coated gold surfaces were prepared through aminolysis using the same method previously described in branched poly(VBPT-*co*-PEGMA)-coated gold surfaces preparation.

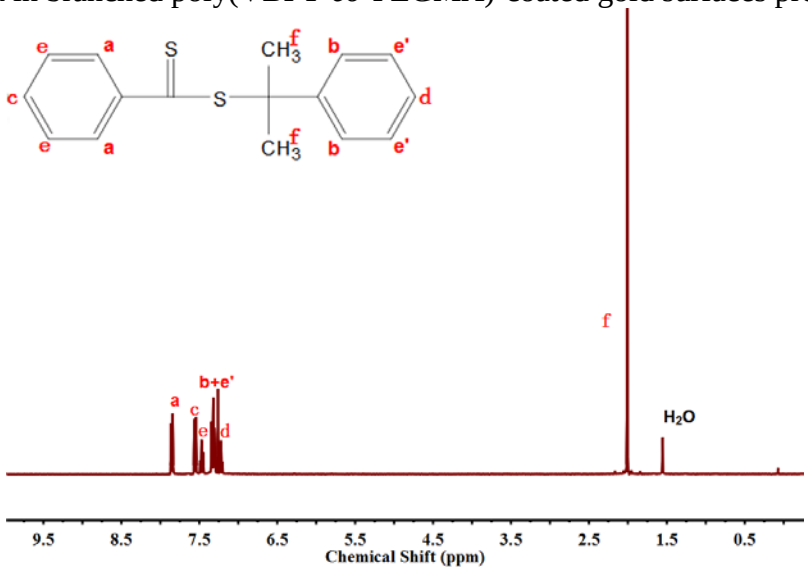

Fig. S5. ^{1}H NMR spectrum of cumyl dithiobenzoate (CDB).

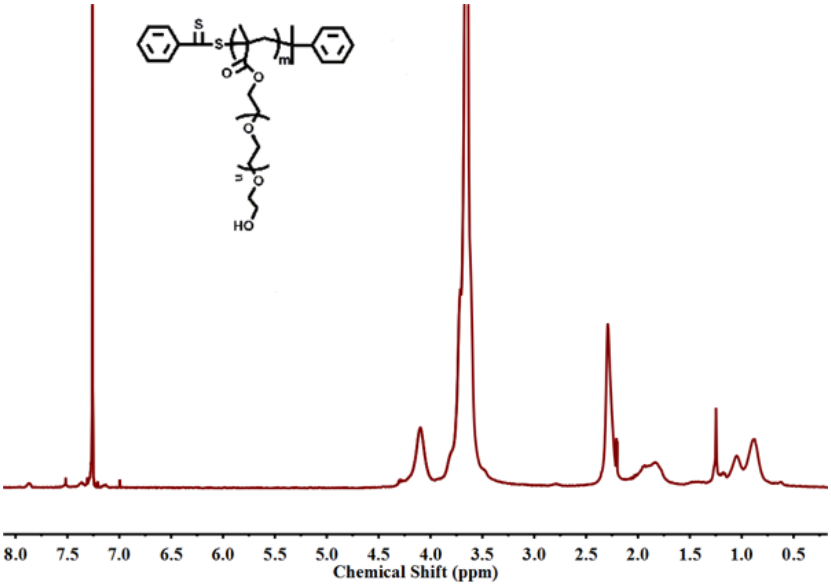

Fig. S6. ^{1}H NMR spectrum of linear PEGMA.

Branched poly(VBPT-*co*-PEGMA)-MA Michael addition reaction

The branched poly(VBPT-*co*-PEGMA)-coated gold substrates were immersed in the THF solution. The contents were flushed with nitrogen for 20 min, and a small amount of the reducing agent, tris(2-carboxyethyl) phosphine hydrochloride (TCEP), was added to the solution. Methyl acrylate (MA), 5-fold molar excess with respect to the RAFT terminals, was add to the reaction mixture which was shaken in an orbital shaker operated at room temperature for 10 h. Subsequently, the branched polymer-MA-coated surfaces were washed thoroughly with THF and Milli-Q water, and finally dried with a stream of nitrogen.

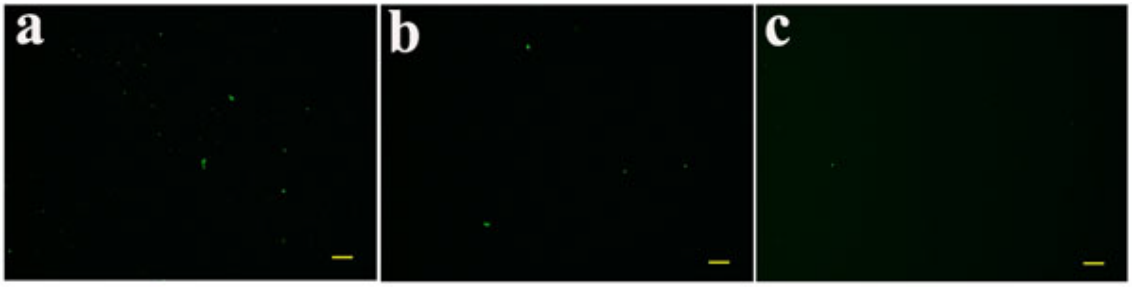

Fig. S7. Fluorescence photographs (10x) of BSA-adsorbed (a) P1-MA-coated surface, (b) P2-MA-coated surface, (c) P3-MA-coated surface. Scale bars represent 100 μm.

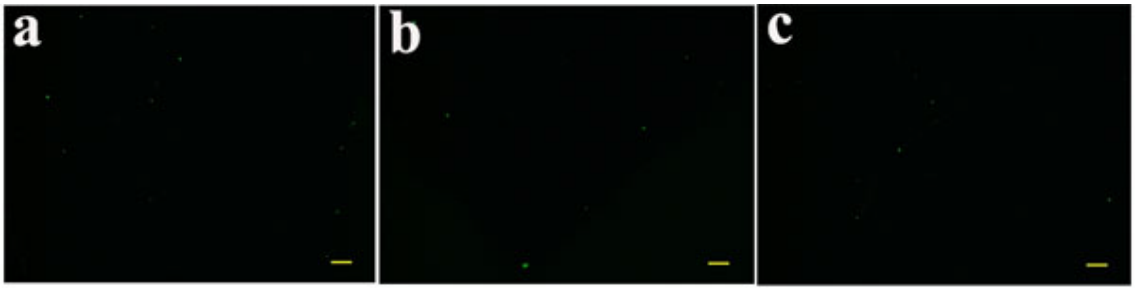

Fig. S8. Fluorescence photographs (10x) of IgG-adsorbed (a) P1-MA-coated surface, (b) P2-MA-coated surface, (c) P3-MA-coated surface. Scale bars represent 100 μm.

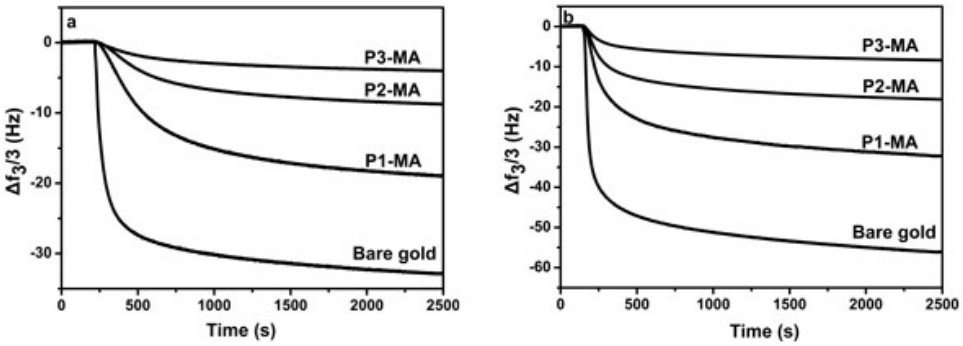

Fig. S9. Adsorption profiles of (a) BSA and (b) IgG onto bare gold and branched polymer-MA-coated gold surfaces.

Table S1 QCM-D analytic results of protein adsorption in PBS at 25℃

Surface	Protein adsorption mass ΔM (ng mm^{-2})	
	BSA	IgG
Bare gold	5.58±0.02	9.58±0.03
Au-P1-MA	3.36±0.08	5.72±0.05
Au-P2-MA	1.56±0.09	3.20±0.12
Au-P3-MA	0.71±0.06	1.49±0.04
Au-Linear PEGMA	0.41±0.02	0.67±0.05

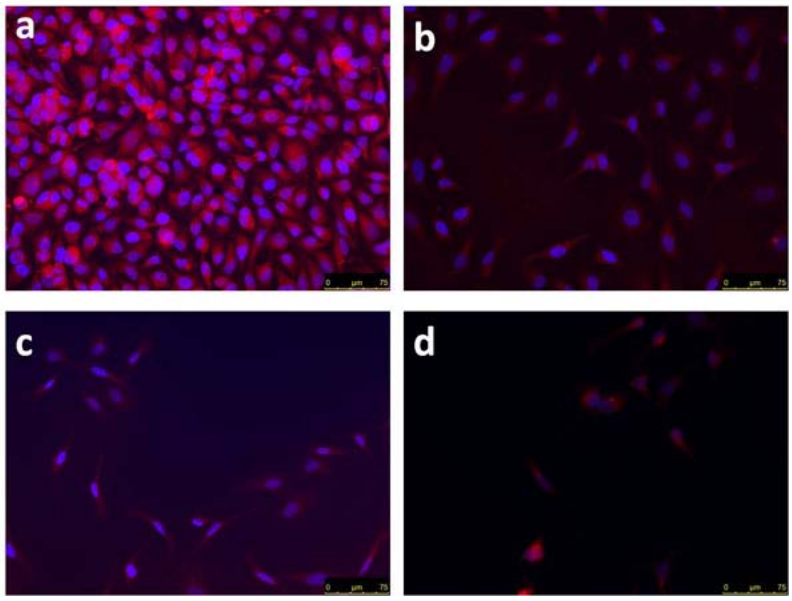

Fig. S10. Fluorescence images (20x) of (a) bare gold, (b) P1-MA-coated surface, (c) P2-MA-coated surface, (d) P3-MA-coated surface after Hela cell incubation for 24 h (Cell nucleuses were stained with DAPI and cell cytoplasm were stained with Eosin). Scale bars represent 75 μm.

[1] J. Xu, J. He, D. Fan, W. Tang and Y. Yang, *Macromolecules*, 2006, **39**, 3753.