Supporting Information

Capturing Red Blood Cells from the Blood by Lectin Recognition on Glycopolymer-patterned Surface

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1. Dependence of grafting degree of PGAMA on GAMA concentration

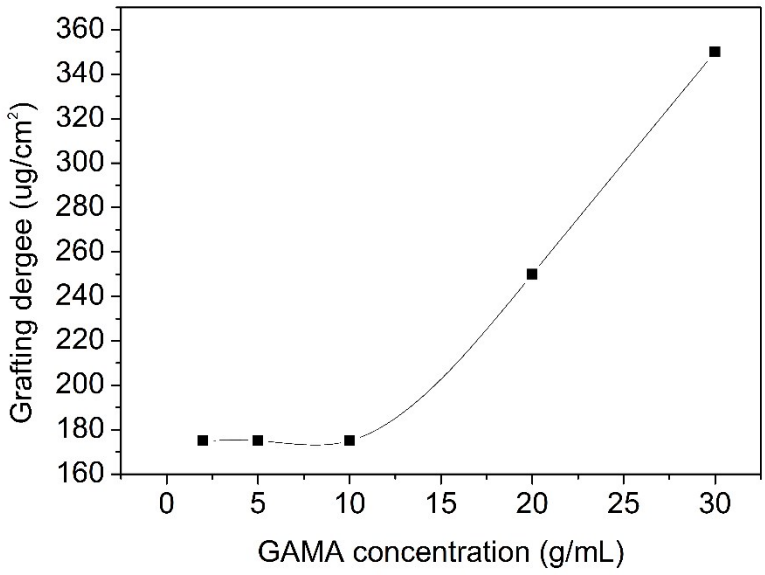

Figure S1. Dependence of the grafting degree of PGAMA on GAMA concentration.

The dependence of the grafting degree of PGAMA was showed in Figure S1. The GAMA concentration had an important influence on the grafting degree. The grafting degree increased rapidly with the increase of GAMA concentration from 10 to 30 g/mL, while at the initial stage, the change of grafting degree was relatively flat. Because the active sites on the membrane surface have more chances to react with GAMA monomer, the grafting degree increased with the increased of monomer concentration, but at higher monomer concentration (30 g/mL), the viscosity of the GAMA solution became higher and the diffusion of monomer from the solution to the membrane surface was hindered, so the monomer concentration of 20 g/mL was used to pattern surface, the corresponding grafting degree was 250 μg/cm^2.

2. Water Contact Angle of SEBS Grafted with GAMA.

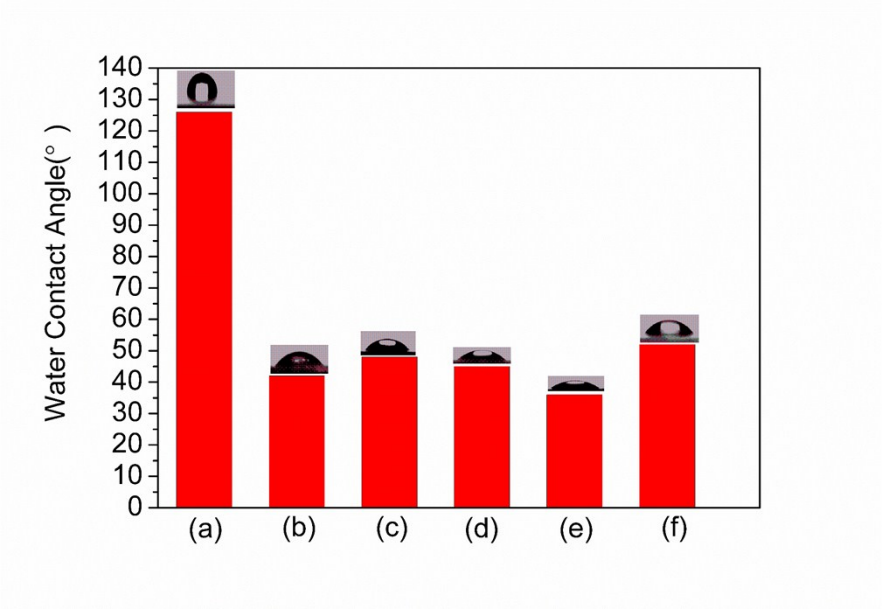

Figure S2. Water contact angles of membranes with different GAMA monomer concentration. (a) virgin SEBS (b) 2g/mL of GAMA solution, (c) 5g/mL of GAMA solution, (d) 10g/mL of GAMA solution, (e) 20g/mL of GAMA solution, (f) 30g/mL of GAMA solution.

Figure S2 showed the static water contact angle results of the nascent and modified membrane samples. Within the experimental range of monomer concentration, the static contact angle decreases evidently from about 126° to 35°, when the GAMA monomer concentration was 20 g/mL, the water contact angle value was 35°, which was pretty suitable for blood-related biomaterials. And the static water contact angle results proved that the GAMA modification endowed the SEBS membrane surface a much better hydrophilicity. Combined with Figure S1, much better GAMA monomer concentration (20 g/mL) was selected in our experiment.

3. Core-level XPS Spectra of SEBS and Modified SEBS

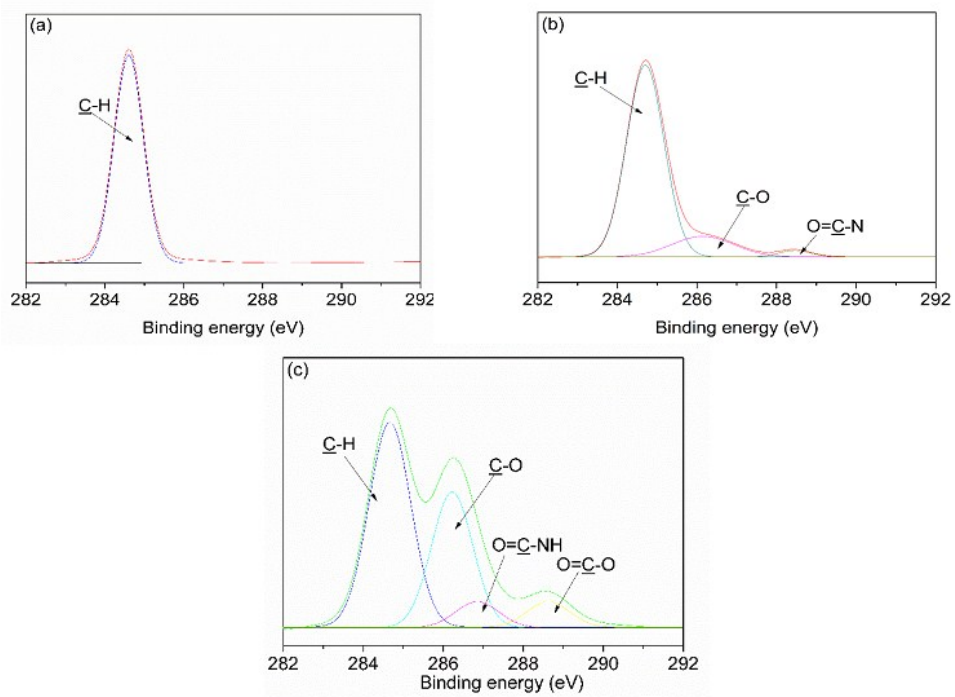

Figure S3. Core-level XPS spectra of the C1s for (a) virgin SEBS, (b) SEBS-g-PAMPS, (c) SEBS-g-PAMPS-g-PGAMA.

The high-resolution spectra corresponding to C_{1s} were shown in Figure S3 to distinguish the virgin and functionalized SEBS membranes. For the virgin SEBS membrane, there was only a single peak at 284.5 eV attributed to C-H species (Figure S3a). Compared with the virgin SEBS film, the C_{1s} spectrum of the SEBS-g-PAMPS film showed three peaks at 284.5, 286.2 and 288.5eV, corresponding to the C-H, C-O and O=C-N species, respectively. These values directly proved PAMPS brushes successfully grafted onto SEBS surface via SIPP (Figure S3b). Successful anchoring of GAMA onto the SEBS-g-PAMPS film surface was substantiated by the appearance of peaks curve-fitted with four peak components. These peak components at the binding energies of 284.5, 286.2, 287.2, and 288.5 eV were assigned to the C-H, C-O,

O=C-NH and O=C-O species, respectively (Figure S3c).

4. Thickness of PAMPS Layer and PGAMA Layer

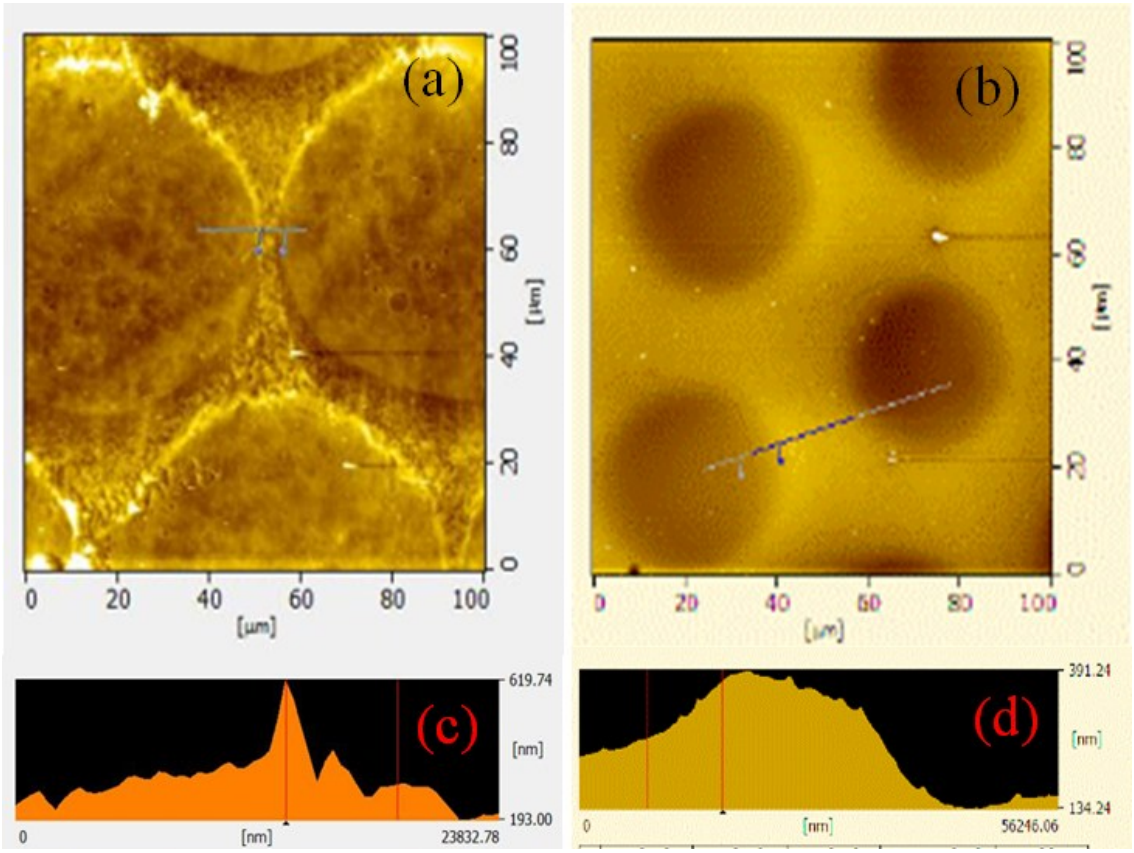

Figure S4. AFM images of the patterned SEBS surfaces and corresponding line profiles. (a) SEBS-g-PAMPS surface, (b) SEBS-g-PAMPS-PGAMA surface, (c) line profile of SEBS-g-PAMPS surface, (d) line profile of SEBS-g-PAMPS-PGAMA surface.

Atomic force microscopy (AFM) has become a powerful tool for measuring the thickness of polymer layer in recent years. The model surfaces with the patterned polymer chains made it possible for AFM to measure the layer thickness accurately. Figure S4 presented the AFM images and their corresponding line profiles of the patterned SEBS-g-PAMPS and SEBS-g-PAMPS-g-PGAMA surfaces, respectively.

As for the patterned SEBS-g-PAMPS sample, PAMPS chains selectively grew on the UV-irradiated areas. Figure S4a showed an AFM image of patterned SEBS without grafting reaction, the relative height of the UV exposed domains appeared to be approximately 314 nm lower than that of UV unexposed domains. This phenomenon was mainly caused by the etching process of UV irradiation. Thus, the thickness of PAMPS brushes was about 314 nm based on the thickness profile. Figure S4b showed an AFM image of patterned SEBS-g-PAMPS-PGAMA sample, the height of the UV unexposed domains appears to be approximately 107 nm lower than that of UV exposed domains. Therefore, the thickness of the PGAMA layer was about 107 nm.

5. Cyto-compatibility of Patterned Surface.

The cyto-compatibility of patterned surface was evaluated by the morphology of captured RBCs. The fresh blood from healthy white rabbits was diluted with PBS at the ratio from 1/5 to 1/20. The virgin and patterned SEBS were placed into cell culture plates and sterilized with UV irradiation for 15 min at 37 °C. 80 μL of diluted blood was dropped on the sample surfaces and incubated for 1 h under static conditions at 37 °C. After the incubation, the samples were carefully rinsed with pre-warmed isotonic saline, followed by fixing with 2.5 vol% glutaraldehyde for 1 h at 37 °C. Finally, the samples were freeze-dried. The captured RBCs on virgin SEBS and the patterned surface were visualized by FESEM. The SEM images of captured RBCs in virgin SEBS and patterned surface were shown in Fig. S5a and S5b. The statistical results of captured RBCs on the virgin SEBS surface and patterned surface were

shown in Fig.S5c. We compared the numbers of RBCs with normal shape on patterned surfaces and virgin SEBS surfaces based on SEM images. The high ratio of RBCs with normal shape confirmed the high cytocompatibilility of patterned surface.

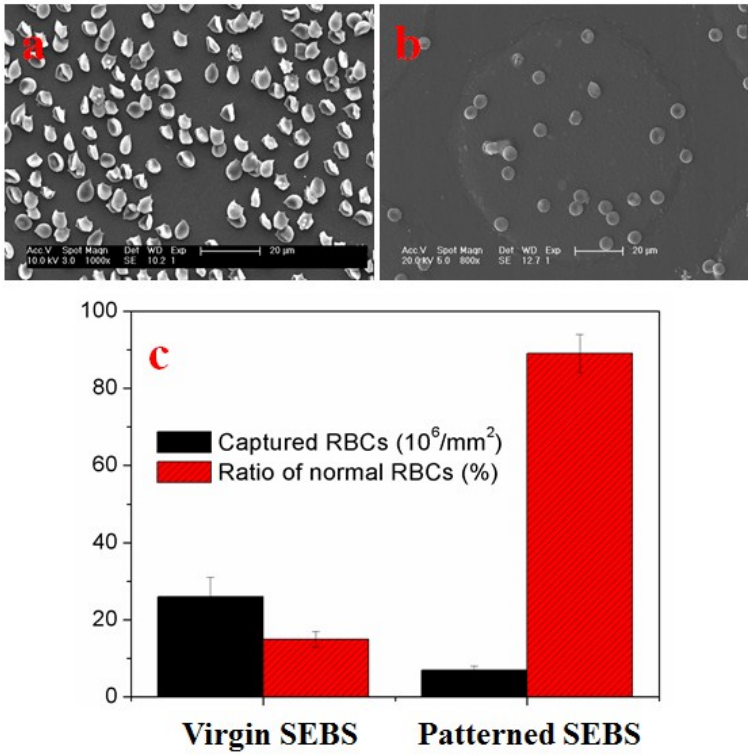

Figure S5. SEM images of captured RBCs in virgin SEBS (a) and patterned surface (c) and the statistical results of captured RBCs (c).