

Electronic Supplementary Information

Experimental

Materials

Glycidyl methacrylate (GMA), ethylene dimethacrylate (EDMA), lauryl methacrylate (LMA), 10-undecylenic acid, and [2-(methacryloyloxy)ethyl]-dimethyl-(3-sulfopropyl) ammonium betaine (SPE) were obtained from Sigma-Aldrich (Shanghai, China) and purified by passing them through an aluminum oxide column for removal of inhibitor. 3-(trimethoxysilyl)propyl methacrylate, 2,2-dimethyl-2-phenylacetophenone (DMPA), cyclohexanol, 1-decanol, cystamine dihydrochloride, and tris(2-carboxylethyl)phosphine hydrochloride (TCEP) were purchased from ACROS (Beijing, China). All other chemicals were purchased from Beijing Chemical Plant (Beijing, China) and used as received. Borofloat glass plates 6.6 × 3.3 cm, 1.1 mm thick were purchased from Scinan Specialty Glass Co., Ltd. (Qinhuangdao, China).

Instrumentation

Photopolymerization and photografting of monolithic layers were carried out using an ultraviolet light source MUA-165 (Mejiro Genossen, Japan) with an intensity of 12 mW/cm² at 365 nm. Scanning electron micrographs of monoliths were obtained using a Hitachi Hybrid scanning electron microscopy SU-1510 (Hitachi High-Technologies, Tokyo, Japan). Contact angle measurements were conducted with an OCA20 contact angle system (Dataphysics Instruments GmbH, Germany), and operated at ambient temperature. Atomic force microscope (AFM) measurements were carried out on an SPI 3800N Probe Station (Seiko Instruments Inc, Japan).

Preparation of the monolithic layer

Preparation of the glass plates followed process we developed previously [1-3]. For the preparation of nonporous monolithic layers, a polymerization mixture comprised of 60% glycidyl methacrylate, 40% ethylene dimethacrylate, and 2,2-dimethyl-2-phenylacetophenone (DMPA) initiator (1% with respect to monomers) (all wt.%) was

homogenized by sonication for 10 min and degassed by purging with nitrogen for 5 min. Teflon film strips with a thickness of 50 μm were placed along the longer sides on the top of a glass plate functionalized with 3-(trimethoxysilyl)propyl methacrylate, then covered with another glass plate, and clamped together to form a mold. The assembled mold was then filled with the degassed polymerization mixture described above, and irradiated with UV light for 15 min.

For the preparation of porous monolithic layers, a polymerization mixture containing 24% glycidyl methacrylate, 16% ethylene dimethacrylate, 40% 1-decanol, 20% cyclohexanol, and 2,2-dimethyl-2-phenylacetophenone (DMPA) initiator (1% with respect to monomers) (all wt.%) was used. Other preparative conditions for porous monolithic layers were the same as those for nonporous monolithic layers (*vide supra*).

After completion of the polymerization, the mold was disassembled, the plates were immersed in a beaker filled with methanol, and left overnight to extract unreacted chemicals and porogens. Finally, the plates were dried in a vacuum at room temperature.

Preparation of thiol-containing monolithic layers

The generic poly(glycidyl methacrylate-ethylene dimethacrylate) monolithic layer was first reacted with 1.0 mol/L cystamine dihydrochloride dissolving in 2.0 mol/L aqueous sodium hydroxide at room temperature for 2 h. The monolithic layer was then flushed with water until the pH of the eluent was neutral followed by capping unreacted epoxy groups with 1.0 mol/L propylamine using the same conditions described above.

Thiol-containing monolith was prepared by reacting with 0.25 mol/L TCEP solution at room temperature for 2 h to reduce the disulfide bonds. The monolithic layer was then washed with water.

Functionalization of thiol-containing monolithic layers via photo-initiated “thiol-ene” click chemistry

A mixture of lauryl methacrylate and 10-undecylenic acid varying in different fractions with a total concentration of 1 mmol/L in methanol was used to functionalize the thiol-containing monolithic thin layer to generate a pH-responsive surface with

superhydrophobicity under acidic conditions. For the preparation of a pH-stimuli surface with superhydrophobicity under basic conditions, a mixture of lauryl methacrylate and [2-(methacryloyloxy)ethyl]-dimethyl-(3-sulfopropyl) ammonium betaine varying in proportions with a total concentration of 1 mmol/L in acetone and water was adopted. The modification mixture containing 0.05 mmol/L DMPA initiator was filled into an assembled mold consisting of one thiol-containing monolithic thin layer plate and one plain glass plate. The surface modification via “thiol-ene” reaction was carried out by exposing to UV light at 360 nm with an intensity of 12 mW/cm² for 15 min. After this reaction, the monolithic layer was washed with methanol or water to remove unreacted components.

References

- [1] R. Bakry, G.K. Bonn, D. Mair, F. Svec, *Anal. Chem.* 79 (2007) 486.
- [2] S.D. Woodward, I. Urbanova, D. Nurok, F. Svec, *Anal. Chem.* 82 (2010) 3445.
- [3] I. Urbanova, F. Svec, *J. Sep. Sci.* 34 (2011) 2345.