

Electronic Supplementary Information

Fabrication of a novel cascade high-pressure electroosmotic pump

Feifang Zhang,^a Rong Wang^a, Bingcheng Yang,^{*a} and Xinmiao Liang^{a,b*}

^a School of Pharmacy, East China University of Science and Technology, Shanghai
200237, China.

^b Dalian Institute of chemical Physics, The Chinese Academy of Sciences, Dalian,
116023, China

Correspondence: Dr. Bingcheng Yang, School of Pharmacy, East China University
of Science and Technology, Shanghai 200237, China

Email: bcyang@ecust.edu.cn

Tel/Fax: 0086-21-64250622

EXPERIMENTAL SECTION

Preparation of ion exchange monolithic column

Reagents

(3-Methacryloxypropyl)trimethoxysilane (γ -MAPS) and 4-vinylbenzyl chloride were obtained from Acros Organics. Divinylbenzene (DVB), sodium 4-vinylbenzenesulfonate and α , α' -azoisobutyronitrile (AIBN) were provided by Aladdin Corp. (Shanghai, China). N,N-dimethylethanolamine, tetrahydrofuran, dimethyl sulfoxide and n-octanol were from Shanghai Lingfeng Company, they were used as received. DVB were extracted with 5% aqueous sodium hydroxide before use. Milli-Q ultrapure water was used throughout.

Preparation of the monolithic columns

The capillary inner wall was pretreated with γ -MAPS to ensure the anchoring of monolithic polymer matrix, referring to the procedure described elsewhere [1]. The polymer matrix was prepared by in situ polymerization in the pretreated capillary. The preparation procedures were as follows. For cation exchange monolithic column (CEMC), the monomers (50 μ l of DVB and 1mg of sodium 4-vinylbenzenesulfonate) were dissolved into a binary porogenic solvent (30 μ l of dimethyl sulfoxide, 130 μ l of n-octanol). After purging with nitrogen for 3 min, 1mg AIBN was added to the monomer solution, followed by ultrasonication for 1 min. The final solution was aspirated into the capillary, and both ends of the capillary were sealed with silicon septa. The polymerization was left in a 70°C water bath to proceed for 20 h. The

monolithic polymer gel was thus synthesized and then washed with methanol and water to remove the unreacted solvents and monomers present in the column.

The preparation procedure of anion exchange monolithic column (AEMC) was similar to that of CEMC. Briefly, the monomer solution containing 50 μ l DVB, 50 μ l 4-vinylbenzyl chloride, 20 μ l tetrahydrofuran, 130 μ l n-Octanol was purged with nitrogen for 3 min, followed by addition of 1mg AIBN and then treated by ultrasonication for 1 min. The final solution was aspirated into the capillary, and both ends of the capillary were sealed with silicon septa. The polymerization was left in a 70 °C water bath to proceed for 20 h. The monolithic polymer gel was thus synthesized and then washed with methanol and N-dimethylethanolamine and finally with water to remove the unreacted solvents and monomers present in the column.

References

1. Li, Y.; Liao, J. L.; Nakazato, K.; Mohammad, J.; Terenius, L.; Hjertén, S. *Anal. Biochem.* **1994**, 223, 153-158