

Electronic Supplementary Information (ESI) of the manuscript:

Practical approach for macroporous structure embedded microfluidic system and the catalytic microchemical application

ZuoYi Xiao,^a Yun Zhao,^a Anjie Wang,^a Jayakumar Perumal^b and Dong-Pyo Kim^{*b,c}

^a State Key Laboratory of Fine Chemicals, Dalian University of Technology, 158 Zhongshan Road, Dalian 116012, People 's Republic of China.

^b Center of Applied Microfluidic Chemistry, Fine Chemical Engineering and Chemistry, Chungnam National University, Daejeon 305-764, Korea.

^c Graduate School of Analytical Science and Technology, Chungnam National University, Daejeon 305-764, Korea.

* To whom correspondence should be addressed: E-mail: dpkim@cnu.ac.kr Fax: (+82) 42 823 6665

XPS spectrum of Pd immobilized on the porous PFPE structure

Fig. 1S shows the evidence of Pd existence on the porous PFPE surface. The peak at binding energy 335.2 eV corresponds to a zero-valent state of Pd(0), while the other two components at 336.7eV and 338.1 eV are assigned to non zero-valent state. According to the literatures,^{1,2,3} the peak at 336.7 could be attributed to Pd-O which indicates the oxidized Pd metal in air, and the peak at 338.1 eV is considered to be Pd(II) ion.

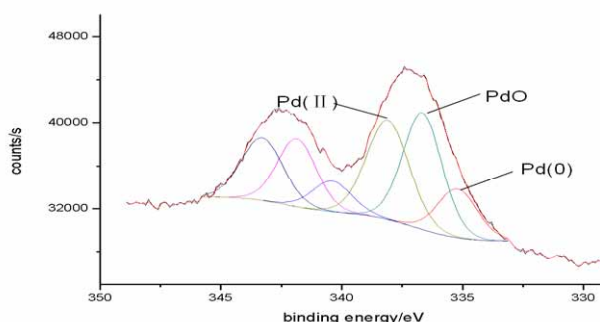
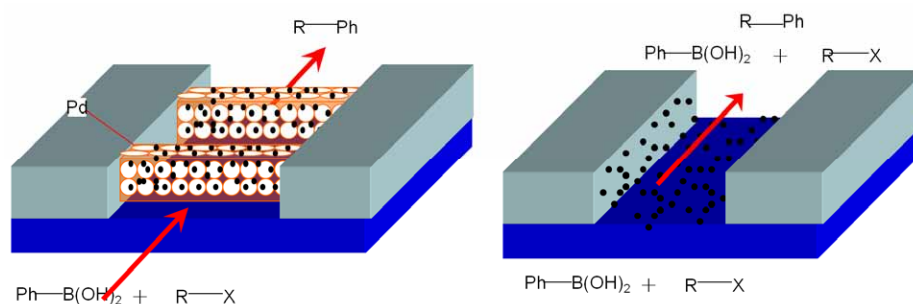


Fig. 1S. The Pd 3d XPS spectra from the implanted Pd on macroporous PFPE surface.

Comparative catalytic microchemical reactions

The Pd catalyst implanted macroporous PFPE was built in the SU-8 microchannel as described in Scheme 1. The plain microreactor with no PFPE porous patterns in the channel was prepared by immobilizing Pd nanoparticle on flat SU-8 surface. Both microreactors were used for Suzuki coupling reaction in a comparative manner.



Scheme 1S. Comparative schematic diagram for catalytic microchemical reaction with a macroporous PFPE built-in microreactor and a plain microreactor.

HPLC measurement of Suzuki coupling reaction product

The separation and analysis of the reaction product was achieved on a C18 column (4.6×250 mm, $5 \mu\text{m}$, Phenomenex) using guard column of C18 cartridge (3.0×4.0 mm). A gradient elution was used for separation with water (A) and acetonitrile (B). At a flow rate of 1.0 ml/min, the following gradient was used: 0 min, 35% B and held at 35% for 5 min; 10 min, 50% B; 15 min, 100% B and held at 100% for 10 min. The chromatogram was monitored at a wavelength of 254 nm throughout the experiments. The injection volume was $8 \mu\text{l}$.

- 1 J. F. Moulder, W. F. Stickle, P. E. Sobol and K. D. Bomben, *Handbook of X-Ray Photoelectron Spectroscopy*; Perkin-Elmer: Eden Prairie, MN, 1992.
- 2 Y. Xiong and J. Chen, *Nano Lett.*, 2005, **5**, 1237-1242.
- 3 M. Hasik, A. Bernasik, A. Drelinkiewicz, K. Kowalski, E. Wenda and J. Camra, *Surface Sci.*, 2002, **507-510**, 916-921.