

## Supplementary Information to

# A fully automated portable gas chromatography for sensitive and rapid quantification of volatile organic compounds in water

Menglian Zhou,<sup>ab+</sup> Jiwon Lee,<sup>ab+</sup> Hongbo Zhu,<sup>ab</sup> Robert Nidetz,<sup>bc</sup>  
Katsuo Kurabayashi<sup>bc</sup> and Xudong Fan<sup>\*ab</sup>

<sup>a</sup>Department of Biomedical Engineering, University of Michigan,  
1101 Beal Avenue, Ann Arbor, Michigan 48109, United States

<sup>b</sup>Center for Wireless Integrated MicroSensing and Systems (WIMS<sup>2</sup>),  
University of Michigan, Ann Arbor, MI, 48109, United States

<sup>c</sup>Department of Mechanical Engineering, University of Michigan,  
2350 Hayward, Ann Arbor, Michigan, 48109, United States

<sup>+</sup>Equal contribution

<sup>\*</sup>Correspondence: [xsfan@umich.edu](mailto:xsfan@umich.edu)

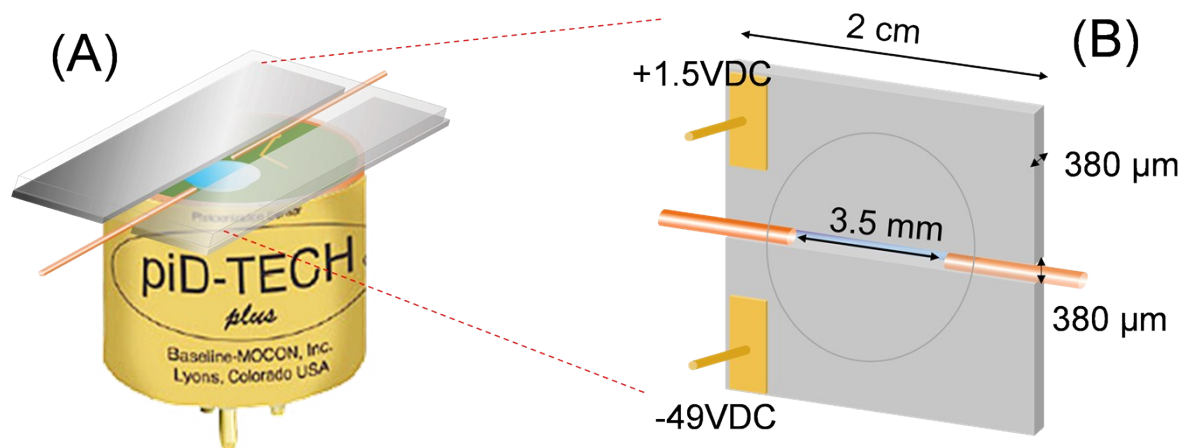


Figure S1. Schematic of a home-made PID module with built-in lamp drive circuit and amplifier from a commercial PID. (B) The dimensions and electrical connections of the PID module. A 380 μm wide, 380 μm tall and 2 cm long microfluidic channel was created by a gap between two conductive silicon wafers. A small segment of a guard column was inserted to the channel inlet/outlet for fluidic connection. The bottom and top of the microfluidic channel were covered by a Krypton UV lamp and a glass slide, respectively, which were then glued to the conductive silicon wafers with an optical epoxy. The UV illumination length was about 3.5 mm defined by the Krypton window diameter. Two copper wires with copper tape were bonded to the wafers and connected to the amplifier.

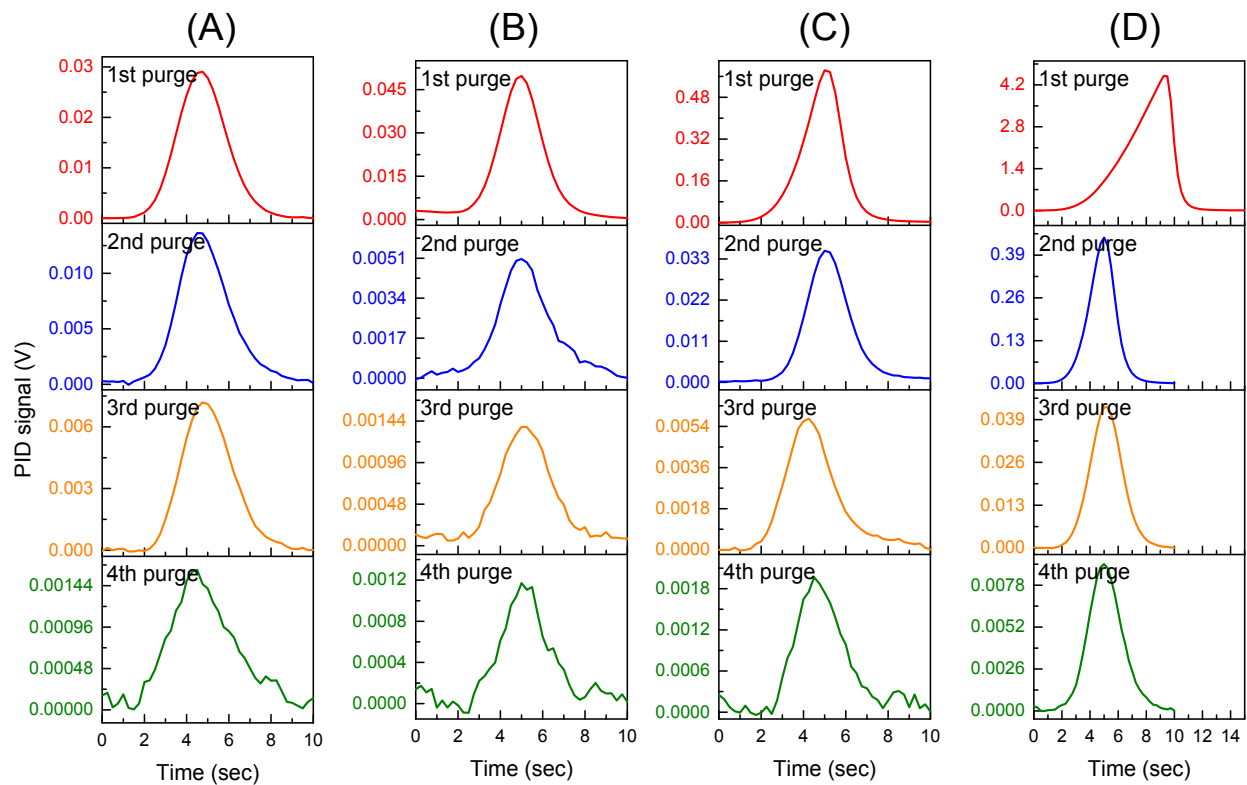


Figure S2. System responses of 4 times of consecutive extraction of p-xylene in water. Each extraction time was 5 minutes. (A)  $V_g/V_f=20$ , p-xylene concentration:  $5 \mu\text{g L}^{-1}$ . (B)  $V_g/V_f=50$ , p-xylene concentration  $5 \mu\text{g L}^{-1}$ . (C)  $V_g/V_f=50$ , p-xylene concentration  $50 \mu\text{g L}^{-1}$ . (D)  $V_g/V_f=50$ , p-xylene concentration  $500 \mu\text{g L}^{-1}$ .

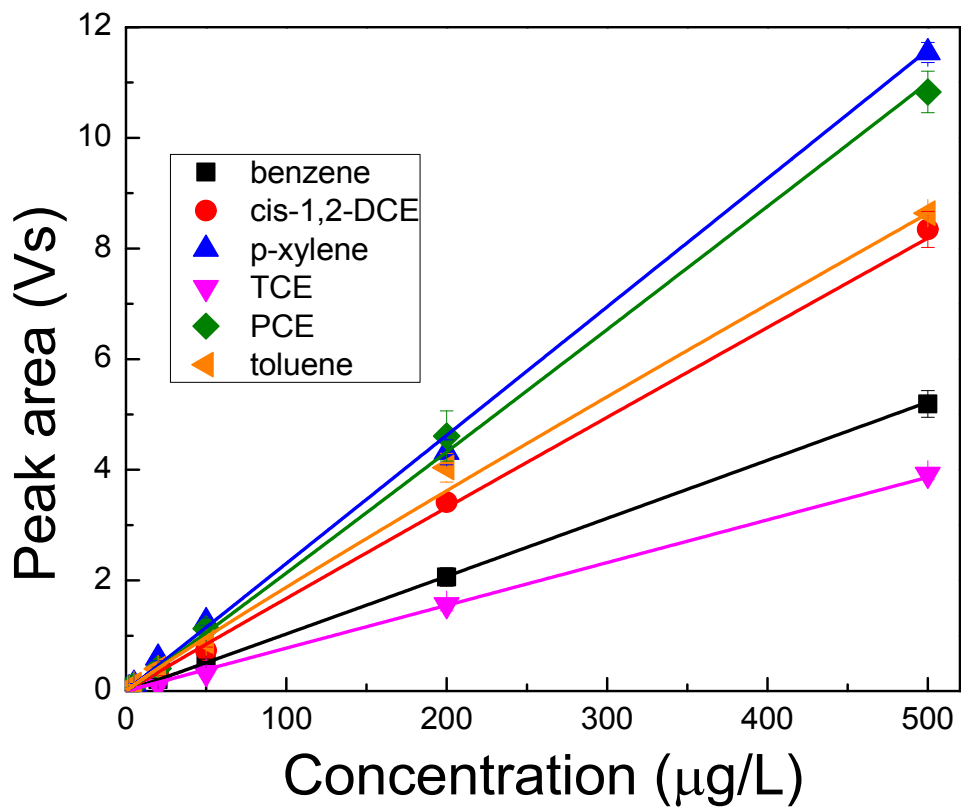


Figure S3. Peak area as a function of the analyte concentration in water are plotted in the linear-linear scale. Error bars are obtained with three measurements. Solid lines are the linear fit in the linear-linear scale. The R-square is 0.999, 0.991, 0.996, 0.990, 0.997 and 0.996 for benzene, cis-1,2-DCE, p-xylene, TCE, PCE, and toluene, respectively. The corresponding log-log scale plot is shown in Fig. 5.