Performance Enhancement of a Quartz Tuning Fork Sensor using a Cellulose Nanocrystal-Reinforced Nanoporous Polymer Fiber

Wuseok Kim †, Eunjin Park †, and Sangmin Jeon *

Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), 77 Cheongam-Ro, Nam-Gu, Pohang, Gyeongbuk, Republic of Korea
† The authors contributed equally to this paper.
* Correspondence: jeons@postech.ac.kr; Tel.: +82-054-279-2392

Figure S1. SEM images of (a) P30 fibers, (b) P60 fibers, (c) CP30 fibers, and (d) CP60 fibers.
Figure S2. SEM images of CNC/PMMA fiber (3:7, wt/wt) after dropping 100 μl of THF (a) 1 time, (b) 3 times, (c) 5 times, and (d) 10 times.
Figure S3. (a) Normalized frequency change of P30-QTF (red) and CP30-QTF (blue) upon exposure to 25 % ethanol vapor (b) Normalized frequency change of CP30-QTF (blue) and CP60-QTF (magenta) upon exposure to 25 % ethanol vapor.
Table S1. Performance of bare-, P30-, CP30-, P60-, CP60-QTFs for ethanol sensing.

|        | LOD | Response Time | |Δf| at EtOH 25 % | SNR at EtOH 25 % |
|--------|-----|---------------|-----------------|----------------|------------------|
| Bare QTF | 20 % | - | < 0.1 | 7.5 |
| P30 | 15 % | 465 s | 51.7 | 487.7 |
| CP30 | 5 % | 223 s | 177.9 | 2869.8 |
| P60 | 10 % | < 1 min | 47.5 | 1826.9 |
| CP60 | 3 % | < 1 min | 173.0 | 2369.7 |