Prof. Yi-Je Juang

莊怡哲 教授

Ph.D.： Department of Chemical and Biomolecular Engineering
The Ohio State University, USA

Email： yjjuang@mail.ncku.edu.tw

Phone： 886-6-2757575 ext 62653

Office： Room No.93715 (7F)

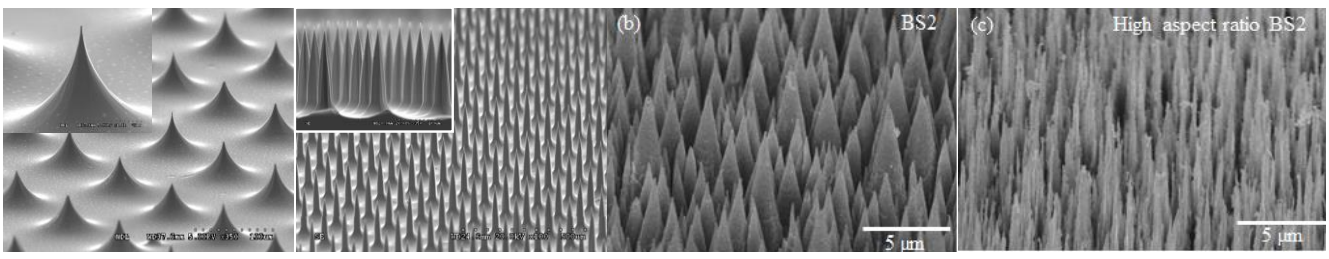
Research Interests

The primary research focus in our lab is to (1) develop and establish novel micro/nanofabrication techniques and (2) study the flow behavior and manipulation of micro/nanoparticles (including biomolecules) inside micro/nanofluidic devices. Through our developed techniques and understanding of fluidics, the lab chips with designed functions and the substrate with micro/nanostructures have been constructed, which can potentially be used for biomedical applications, chemical and biological analysis and development of nanoelectronics. Besides research regarding micro/nanofabrication and micro/nanofluidics in general, several specific topics are also involved such as energy-related research (e.g. sorting and analysis of microalgae in biofuel production, microfluidic fuel cell), fabrication of microneedles for transdermal drug delivery, microfluidic paper-based analytical devices (uPAD), etc.

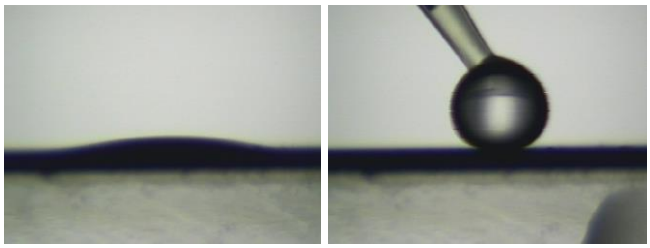
Representative Publications

- Jheng, Z.-J., Fang, Y.-C., Lo, K.-F., and **Juang, Y.-J.***, "Reinforcement of a poly(dimethyl siloxane) mold with high aspect ratio microstructures via a gas–liquid phase sol–gel process", *Journal of Micromechanics and Microengineering*, **19**, 045016 (6pp) (2009) (SCI, IF: 2.233, 12/112 in Mechanics).
- Lo, K.-F., and **Juang, Y.-J.***, "Fabrication of long poly(dimethyl siloxane) nanochannels by replicating protein deposit from confined solution evaporation", *Biomicrofluidics*, 6, 026504 (2012) (SCI, IF: 3.385, 3/31 in Physics, Fluids & Plasma).
- Deng, Y.-L. and **Juang, Y.-J.***, "Electrokinetic trapping and surface enhanced Raman scattering detection of biomolecules using optofluidic device integrated with a microneedles array", *Biomicrofluidics*, **7**, 014111 (9pp) (2013) (SCI, IF: 3.771, 3/31 in Physics, Fluids & Plasma).
- Deng, Y.-L. Chang, J.-S., and **Juang, Y.-J.***, "Separation of microalgae with different lipid contents by dielectrophoresis", *Bioresource Technology,* **135**, 137-141 (2013) (SCI, IF: 4.75, 1/12 in Agricultural Eng.).
- Deng, Y.- L., and **Juang, Y.-J.***, "Black silicon SERS substrate: Effect of surface morphology on SERS detection and application of single algal cell analysis", *Biosensors and Bioelectronics,* **53**, 37-42 (2014) (SCI, IF: 6.451, 1/27 in Electrochemistry)

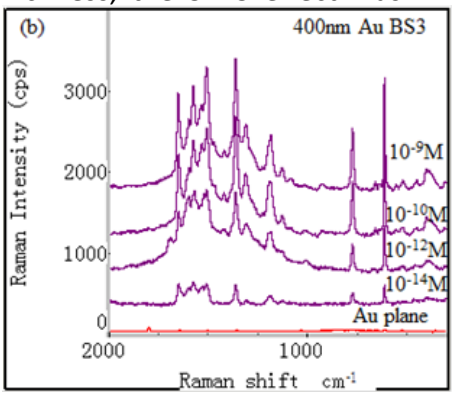
❖ Silicon microneedles and black silicon fabricated by inductively coupled plasma (ICP) etching process



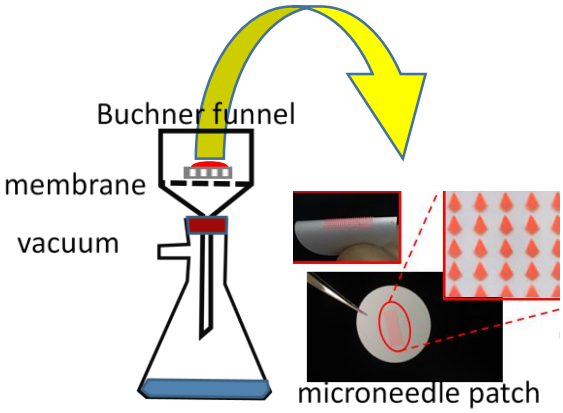
- Modification of black silicon to achieve superhydrophilicity or superhydrophobicity



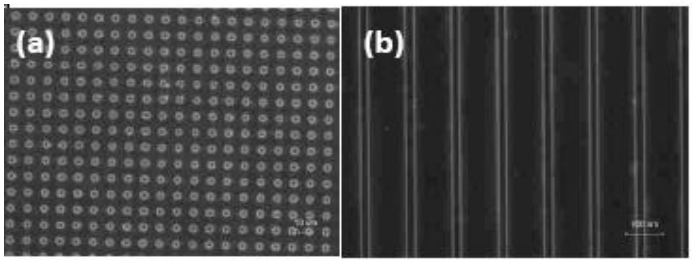
- A black silicon substrate was constructed by ICP process. After depositing the gold layer with proper thickness, the SERS effect was realized and the R6G was detected at concentration as low as 10 fM.



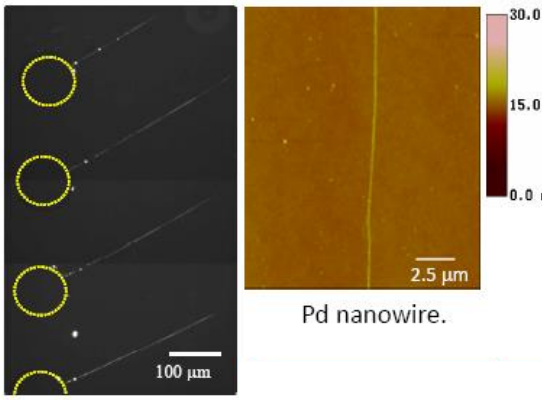
- The PDMS mold having cone-shaped cavities with through holes was placed on top of the filter membrane. The dissolvable polymer microneedles patch was fabricated by dispensing the polymer solution on the mold, followed by filtration process.



- The bovine serum albumin (BSA) droplet was dispensed on the substrate, followed by covering the polydimethylsiloxane (PDMS) mold with microwells (or microtrenches). The BSA then deposited at the edge of the microwells (or microtrenches) in contact with the substrate to form nanorings (or line structures) by confined evaporation process.



- A droplet of DNA solution was dispensed on a substrate, followed by covering the PDMS mold with microwells. The mold was then quickly separated from the substrate and the long DNA nanostrands were formed at the substrate through dewetting process. The metallic nanowires were obtained by subsequently carrying out the reduction reaction.



- The microalgae with different lipid contents possess different crossover frequencies in dielectrophoresis. With proper chip design, continuous sorting of microalgae with different lipid contents can be achieved.