

MEMS/NEMS 연구실

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연구실구성원

- 지도교수 : 조찬섭 교수
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- 석사과정 : 김신웅

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연구분야

□ MEMS/NEMS Devices

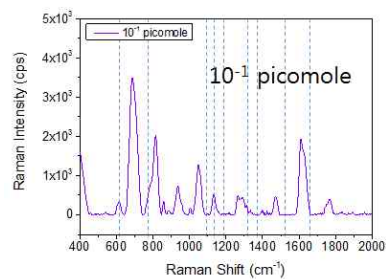
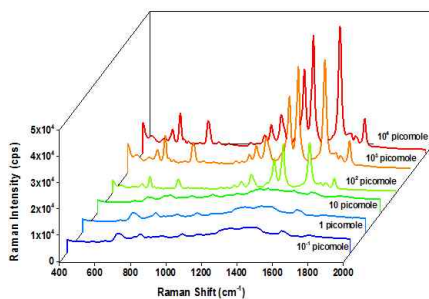
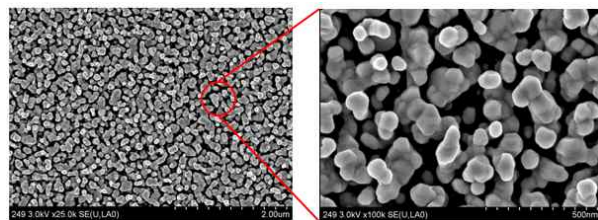
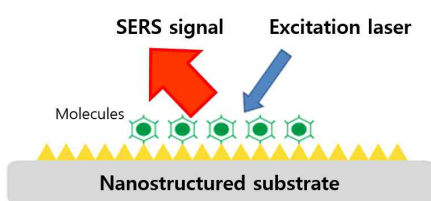
- SERS(Surface enhanced Raman Spectroscopy)용 nano porous metal
- Bio and chemical sensors with SERS
- BGA chip test 용 MEMS Test Socket
- 정전기력을 이용한 multi-electrode peristaltic micropump
- DNA 증폭용 PCR chamber

□ Si Solar cell

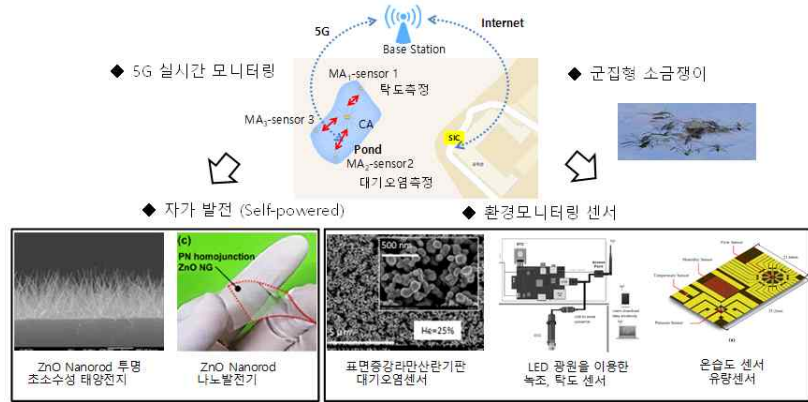
- Solar cell 효율향상을 위한 Si surface texturing
- Solar cell fabrication technology
- Superhydrophobic surface를 위한 Nano 요철구조 형성

□ 관심 분야

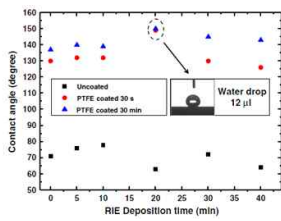
- MEMS/NEMS device with energy harvesting
- MEMS Mechanical Sensor (Giro, Force, Pressure,)
- Si solar cell fabrication for high efficiency



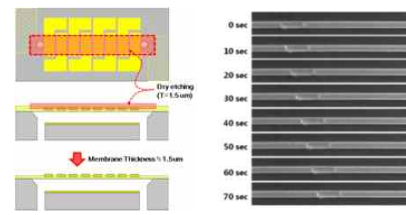
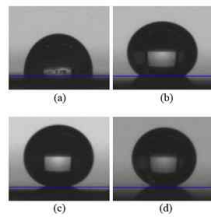
(Nano porous metal for SERS and Chemical Sensor Characteristics)



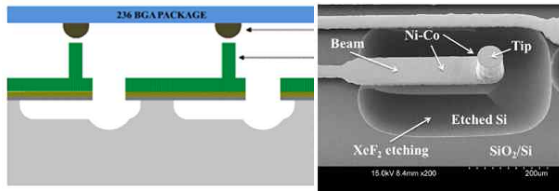
(환경모니터링용 군집형 소금쟁이 드론 로봇)



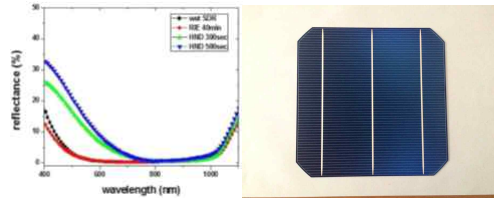
(Superhydrophobic surface)



(peristaltic micropump)



(MEMS Test Socket)



(Solar cell texturing)

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주요 수행과제 및 최근 5년간 연구 논문

□ 주요 수행과제

- 3차원 다공성 나노구조를 이용한 label-free SERS(Surface-enhanced Raman spectroscopy) 기반 화학 및 생체의학센서의 구현 /한국연구재단, 수행중[2020/6.1-]
- 2020년 반도체인프라구축지원사업/ 한국산업기술진흥원 [2020.4- 2021.3]
- 고감도 측정을 위한 표면증강 라만 산란(SERS) 기판용 후각섬모형 3차원 다공성 나노구조 금속 박막제조와 화학 및 생체의학 센서에의 응용/한국연구재단, 수행중[2017/6.1 -2020/5.30]
- 나노 포러스 구조 바이오센서용 웨이퍼 재생기술 및 표면 요철화 기술 개발/산업통상자원부(중소기업 산학협력 기술개발사업[2016.5-2017.4])
- 폐 실리콘 웨이퍼를 활용한 태양전지용 실리콘 웨이퍼 및 texturing 공정 개발/지식경제부 (중소기업산학협력지원사업)
- 차세대 모듈형 프로브 카드 개발/지식경제부(중소기업기술혁신개발사업)

□ 연구 논문

- "Improvement of Surface-enhanced Raman Spectroscopy Response Characteristics of Nanoporous Ag Metal Thin Film with Surface Texture Structures", Journal of Sensor Science and Technology, Vol.29, No.4 pp.255-260, 2020.

- “3D Printed Water Strider Robot with Environmental Monitoring”. Journal of Sensor Science and Technology Vol.28, No.6, pp.407-413, 2019.
- “Highly Manufacturable Nanoporous Ag Films Using New Sputtering System for Surface Enhanced Raman Scattering Substrate”, Journal of Nanoscience and Nanotechnology, Vol. 19, No. 10, 6429-6436 2019.
- “Nanoporous Ag Films Prepared by Cluster-Source Sputtering as Substrates for Surface-Enhanced Raman Scattering”, Phys. Status Solidi A, 1701010, 2018.
- “Probe Array from BeCu Metal Sheet Using Heat and Fusing Currents”, International Journal of Engineering & Technology, Vol.7, 182-186, 2018.
- “High Performance Ultrathin SnO₂ Thin-Film Transistors by Sol-Gel Method”, IEEE Electron Device Letters, Vol.39, No.8, 1179-1182, 2018.
- “Improvement in the performance of sol-gel processed In₂O₃ thin-film transistor depending on Sb dopant concentration”, IEEE Electron Device Letters, Vol.38, No.8, 1027-1030, 2017.
- “High-efficiency micro-textured n-type solar cell”, J. Nanosci. Nanotechnol., Vol.17, No.11, 8418-8424, 2017.
- “Rapid Thermal Processing with Real-Time Measurement Using Type-K Thermocouple,” J. Nanosci. Nanotechnol., Vol. 17, No. 11, 8450-8456, 2017.
- “Porous Nanostructures by Low Vacuum Sputtering for Surface Enhanced Raman Scattering,” J. Nanosci. Nanotechnol. Vol. 17, No. 11, 8528-8533, 2017.
- “Effects on micropylamid and nanoneedle structures for superhydrophobicity on Si surface,” Vacuum, Vol.131, 188-193, 2016.
- “Four-electrode micropump with peristaltic motion,” Sensors and Actuators A: Physical, Vol.245, 19-25, 2016.
- “Combined Effects of Pyramid-Like Structures and Antireflection Coating on Si Solar Cell Efficiency,” Journal of Nanoscience and Nanotechnology, Vol.15, No.10, 7624-7631, 2015.
- “Wet/dry etching combined microtextured structures for high-efficiency solar cells,” Micro Nano Letters, Vol.10, No.10, 528-532,2015.
- “Peristaltic Micropump with Multi-Electrodes Using Electrostatic Force,” Advanced Materials Research Vol.1125, pp 571-576, 2015.
- “Surface texturing method for silicon solar cell using reactive ion etching with metal mesh,” PHYSICA STATUS SOLIDI A-APPLICATIONS AND MATERIALS SCIENCE, Vol.211.6, pp.1844-1849, 2014.

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특허 및 등록출원 현황

□ 국내특허 출원 및 등록

- 태양전지기관의 표면 조직화 구조 형성 방법 및 이를 이용하여 제작된 태양전지기관/10-1382631-00-00/2013
- 초박형 에미터 접합층을 갖는 블랙 실리콘 태양전지 및 그 제조방법/10-1382585-00-00/2012
- 정밀 트리거 신호를 이용한 로봇 비전 검사 시스템 및 그 방법/10-1421672-00-00/2012
- 플라즈마 식각 장치 및 이를 이용한 태양전지의 텍스처링 방법/10-1222910-00-00/2011
- 간헐적 스퍼터링을 이용한 고저항 금속박막 제조방법/10-1200302-00-00/2010
- 태양전지 모듈/10-1128460-00-00/2010

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졸업생 진로 현황