## 차세대 나노 전자/광전소자 기술 연구실

Advanced Nano Electronics & Photonics Technology Lab.



**강동호** 과수

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#### **Education**

2019 Ph.D. in School of Electrical and Computer Science, Sungkyunkwan University
2014 B.S. in School of Electronic and Electrical Engineering, Sungkyunkwan University

#### **Experience**

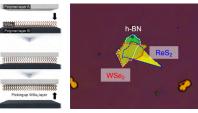
2021 ~ Assistant Professor, EECS, GIST

2019 ~ 2021 Postdoctoral Research Fellow, Nanyang Technological University, Singapore

### 연구실 소개

차세대 나노 전자/광전소자 기술 연구실(Advanced Nano Electronics & Photonics Technology Lab.)은 Silicon 및 Germanium과 같은 기존의 반도체 물질보다 물리적/광학적 특성이 더 뛰어난 차세대 나노 반도체물질을 활용하여 전자소자 및 광전소자를 제작하는 기술을 개발하고, 이를 활용한 차세대 어플리케이션을 제작하는 것을 목표로 한다. 자세하게는, 흑연에서 분리한 2차원 단층 물질인 그래핀(Graphene)을 필두로, 2차원 반도체 물질(e.g., MoS2, WSe2) 및 2차원 절연 물질(e.g., h-BN), 고분자 강유전체 물질 등 특수한 물리적,전기적,광학적 특성을 지닌 물질을 기반으로 한 전자/광전소자 및 이를 활용한 회로 단계 어플리케이션 개발이 목표이다.

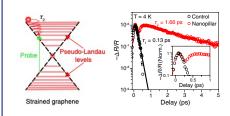
# Research Area 1 | Advanced Semiconductor Device Fabrication Technologies



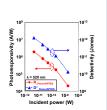
Nanopillar

Sub-µm Scale Fabrication Technology for vdW Heterostructure Wafer Scale Fabrication Technologyfor Advanced Device Platform

#### Research Area 2 | Photonic Applications for Advanced Materials

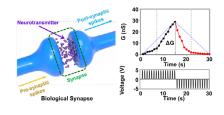


MoS, Perovakite Perova

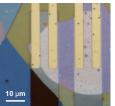


Optical Properties in Pseudo-Landau-QuantizedGraphene Platform Hybrid Structure-Based High-Performance2D Material Photodetector

#### Research Area 3 | Electronic Applications for Advanced Materials



(St) 1.0 (St) 2.0 (St



**Bio-Inspired Synaptic and Neural Devices** 

Programmable Reconfigurable Logic
Device

## 연구 성과

#### 수행중인 주요 연구과제 (주요과제경력)

- · 나노인프라구축혁신사업 (한국연구재단), 2022-2023
- · 란다우 레벨 기반 그래핀 광검출기 제작 (GIST), 2021-2023
- · 차세대 고성능 2D 로직 소자 구현을 위한 Metal-2D 물질 간 컨택 저항 최소화 기술 설계 및 개발 (삼성전자), 2022-2025

#### 주요논문 (대표실적)

- · Pseudo-magnetic field-induced slow carrier dynamics in periodically strained graphene, Nat. Commun. (2021)
- $\cdot$  A Neuromorphic Device Implemented on a Salmon-DNA Electrolyte and its Application to Artificial Neural Networks, Adv. Sci. (2019)
- · Rhenium Diselenide (ReSe2) Near-Infrared Photodetector: Performance Enhancement by Selective p-Doping Technique, Adv. Sci. (2019)
- · A High-Performance WSe2/h-BN Photodetector using a Triphenylphosphine (PPh3)-Based n-Doping Technique, Adv. Mater. (2016)
- · An ultrahigh-performance photodetector based on a perovskite-transition-metal-dichalcogenide hybrid structure, Adv. Mater. (2016)
- · High-performance transition metal dichalcogenide photodetectors enhanced by self-assembled monolayer doping, Adv. Funct. Mater. (2015)
- · Controllable Nondegenerate p-Type Doping of Tungsten Diselenide by Octadecyltrichlorosilane, ACS Nano (2015)

#### 주요특허

- · 부성 미분 전달 컨덕턴스 소자 제조 방법 (한국)
- $\cdot$  DEVICE WITH NEGATIVE DIFFERENTIAL TRANSCONDUCTANCE AND METHOD OF MANUFACTURING THE SAME (미국)
- · 인공 시냅스 소자 및 이의 제조 방법 (한국)

## 융합연구 및 비전 소재 2D materials **Polymer materials Oxide materials** Nanomaterials **Electrical** 소자 **Optical measurements Nano Fabrication** measurements Electronics/ (Absorption, Emission) (I-V, C-V, Pulse, Noise) **Photonics Applications Circuit-level Ubiquitous Neuromorphic**

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