Jun Tao

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Education

University of Southern California — Los Angeles, CA, US
PhD Electrical Engineering — *Expected May 2022*

- Field: Semiconductor Integration, Advanced Electronic and Photonic Devices, Neuromorphic Computing
- Current Research: Build optical neural network (ONN) with InP floating-gate phototransistors

Shanghai University — Shanghai, China
MS & BS, Microelectronics and Solid Electronics — *Aug 2009 – March 2016*

Research Experience

Graduate Research Assistant — Aug 2017 - present
University of Southern California — *Los Angeles, CA, US*

Artificial Neural Synapses for Neuromorphic Computing

- Designed nanowire InP-based FETs to mimic biological neural synaptic behaviors for spiking neural network
- Engineered gate dielectrics of FETs and enabled advanced synaptic behavior emulation of memory consolidation
- Integrated artificial optical neural synapses on amorphous substrate for ultra-fast machine vision
- Explored image recognition accuracy performance from artificial neural network built with InP synaptic transistors

Heterogeneous Semiconductor Integration for 3D Integrated Circuit

- Designed and developed BEOL compatible monolithic III-V semiconductors integration approach: low-temperature (300°C) templated liquid phase method (LT-TLP)
- Demonstrated high electron mobility ($> 6800 cm^2/Vs$ at RT) single crystalline InAs grown by LT-TLP approach
- Integrated large area ($> 1500 \mu m^2$) single crystalline III-V semiconductors directly on amorphous substrates

Graduate Researcher — Aug 2013 - Mar 2016
Shanghai University — *Shanghai, China*

Room-temperature Nuclear Detector

- Designed and fabricate CdZnTe thin film nuclear radiation detector
- Proposed a reaction-dominated growth model for CdZnTe film grown by close-space sublimation approach

Additional Experience

Process Engineer | Etch Department of 14 and 28nm Foundry — Aug 2016 - Apr 2017
Semiconductor Manufacturing International Corporation (SMIC) — *Shanghai, China*

- Maintained 28nm product process line, ensured accuracy of pattern parameters (width and depth) after etching
- Lead Bevel stage project to decrease number of particles, contributed to yield improvement with 200,000 dollar profits increase per month

Teaching Assistant | EE338 Physical Electronics — Fall 2019 and Spring 2020
University of Southern California — *Los Angeles, CA, US*

- Led discussion sections and instructed over 40 undergraduate students
- Charles L. Weber Memorial Outstanding Teaching Assistant Award (Honorable Mentions)

SHINE Mentor | SHINE summer program — Summer 2019 and 2020
University of Southern California — *Los Angeles, CA, US*

- Instructed high school juniors for their summer program, including simple experiment demonstration, electrical characteristics measurements tutorial, artificial neural network simulation tutorial

Skills

Proficient Technologies: Metal Organic Chemical Vapor Deposition (MOCVD), Reactive Ion Etching (RIE), Electron-beam Evaporator, Thermal Evaporator, Sputtering System, Atomic Layer Deposition (ALD), Close-space Sublimation, Photo Lithography, Electron-beam Lithography, Plasma Asher

Metrology Skills: Scanning Electron Microscope (SEM), Energy-dispersive X-ray spectroscopy(EDS), Electron backscatter diffraction (EBSD), Photoluminescence, Time-resolved Photoluminescence (TRPL), Raman, X-ray Diffraction (XRD), Hall effect measurement

Programming Languages: Python, Matlab, Java, HTML/CSS, JavaScript, Swift

Selected Publications

Jun Tao, Debarghya Sarkar, Salil Kale, et al. "Engineering Complex Synaptic Behaviors in a Single Device: Emulating Consolidation of Short-term Memory to Long-term Memory in Artificial Synapses via Dielectric Band Engineering", ***Nano Letters*** 20.10 (2020): 7793-7801

Jun Tao, Debarghya Sarkar, Sizhe Weng, et al. "High Mobility Large Area Single Crystal III-V Thin Film Templates Directly Grown on Amorphous SiO2 on Sillicon", ***Applied Physics Letters***, 117.4 (2020): 042103

Debarghya Sarkar, **Jun Tao (equal contribution)** , Ragib Ahsan, et al. "Monolithic High Mobility InAs-on-Oxide Growth at Low Temperature", ***ACS Applied Electronic Materials*** 2.7 (2020): 1997-2002

Debarghya Sarkar, **Jun Tao (equal contribution)**, Wei Wang, et al. "Mimicking Biological Synaptic Functionality with an Indium Phosphide Synaptic Device on Silicon for Scalable Neuromorphic Computing", ***ACS Nano***, 12.2 (2018): 1656-1663

Hyun Uk Chae, Ragib Ahsan, **Jun Tao**, et al. "Increasing the Hot-Electron Driven Hydrogen Evolution Reaction Rate on a Metal-Free Graphene Electrode." ***Advanced Materials Interfaces*** 8.6 (2021): 2001706.

Hyun Uk Chae, Ragib Ahsan, **Jun Tao**, et al. "Tunable Onset of Hydrogen Evolution in Graphene with Hot Electrons." ***Nano letters***, 20.3 (2020): 1791-1799.

Jun Tao, Haitao Xu, Yuelu Zhang, et al. "Interface Chemistry of CdZnTe Films Studied by a Peel-off Approach", ***Applied Surface Science***, 388 (2016): 180-184

Jun Tao, Haitao Xu, Yuelu Zhang, et al. "X-ray DC Response of a Simple Photoconductive Detector Based on CdZnTe Film", ***Journal of Materials Science: Materials in Electronics***, 27.1 (2016): 645-650

Conferences

Oral presentation, 2018 MRS Spring Meeting & Exhibit, Phoenix, Arizona

Oral presentation, 2018 AVS 65th International Symposium & Exhibition, Long Beach, California

Oral presentation, 2019 AVS 66th International Symposium & Exhibition, Columbus, Ohio

Oral presentation, 2020 EMC 62nd Electronic Materials Conference, Online

Oral presentation, 2021 EMC 63nd Electronic Materials Conference, Online

Oral presentation, 2021 MRS Spring Meeting & Exhibit, Online

Poster presentation, 2020 DRC 87th Device Research Conference, Online

Poster presentation, 2021 DRC 88th Device Research Conference, Online

Awards and Honors

Provost Graduate Fellowship, USC	*Aug 2017*
National Scholarship for Graduate Student, SHU (TOP 1 %)	*Dec 2015*
Excellent Graduate Student Leader, SHU (TOP 1 %)	*Sep 2014*