

Curriculum Vitae
 Jishnu Ganguly
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Industry affiliation(s)

Sr. Engineer (Yield and Integration); Feb 2020-June 2021

GlobalFoundries (Fab8 - Central Functions team) - Process integration and electrical characterization of 14nm finFETs and Back-End-of-Line (BEOL) interconnects;
 Posted in Bangalore.

1 Spotlight award for analysing effects of proposed process changes in line; 3 Appreciation award for clear root-cause analysis.

Education

Doctor of Philosophy (Ph.D.); 2021-present

Electrical Engineering
 University of Notre Dame
 Research Advisor: Dr. Suman Datta

Master of Science (M.S.); 2016-2018

Electrical Engineering
 Tufts University
 Research Advisor: Dr. Kevin Grossklaus

Bachelor of Technology (B. Tech.); 2012-2016

Electronics & Communication Engineering
 Heritage Institute of Technology (MAKAUT)
 Research Advisor: Dr. Anindya Sen

Projects

Strain induced band-gap engineering of $Tl_xGa_{(1-x)}As$ thin-films
 (MS thesis)

Even though Tl-III-V compound semiconductors have been touted to be promising for small band-gap applications in the low wavelength IR (LWIR), fabricating the same has been challenging due to the fundamental lattice mis-match between Tl & III-Vs such as GaAs. This project was aimed at exploring the effect of Tl-induced strain on the optical response of TlGaAs.

Some of what I was responsible for:

- i. low temperature growth of TlGaAs films using Veeco GENxplor MBE system using a valved As-cracker & solid-source effusion cells for group-III elements**
- ii. monitoring film quality & surface reconstructions in real-time using Reflection High Energy Electron Diffraction (RHEED)**
- iii. using Atomic Force Microscopy (AFM) to gauge film surface roughness**
- iv. estimating optical properties such as absorption-edge of the films using spectroscopic Ellipsometry**

Fabrication & resistance characterisation of NiGe contacts on n-doped GaAs

Schottky contacts, with a rectifying response are detrimental to the efficient extraction of majority charge carriers from materials, if a linear I-V curve is warranted. The aim of the project was to fabricate Ohmic contacts on n-doped GaAs & characterise the contact resistance corresponding to each.

I contributed towards:

- i. fabricating the NiGe contacts on n-doped GaAs using photolithography, sputtering**
- ii. implementing Rapid Thermal Annealing (RTA) on the samples after fabrication**
- iii. resistance characterisation using Transfer Line Method (TLM)**

Optoelectronic apparatus to gauge the role of elemental Zr in inter-cell communication in rat cortices

Although it has been theorised that mammalian neural tissues contain elemental Zr, its exact function is yet to be ascertained. This project was directed towards tracking the pathways of Zr between & within neural tissues during inter-cellular electrical signalling. Under the assumption that elemental Zr is photoluminescent, rat cortical tissues would be electrically excited & their optical signal outputs would be recorded.

My contributions included:

- i. developing an SoP for silk fibroin extraction from silk cocoons**
- ii. designing & fabricating the excitation gold nano-electrodes by sputtering on silk**
- iii. designing the optical signal detection mechanism using state-of-the-art Thorlabs optical table & test bench instruments**

Study of mechanical & thermal properties of SiGe nanowires

Nanowires show promise in the development of novel optoelectronic device architectures, such as nanowire-based transistors, which would aid in the preservation of Moore's prediction. Therefore, precise control of composition, morphology & other fundamental physical properties is required to fully unlock their potential.

In this project, I looked into the following:

- i. the variation of Young's modulus & thermal conductivity of the nanowires with diameter**
- ii. Reviewed literature to come up with the pros & cons of different top-down & bottom-up fabrication techniques**

Power-outage management mechanism for low-tension nodes on the power-grid

In developing countries, Low Tension (LT) power distribution systems are open-ended & utility interventions, primarily reactive in nature. In a pre-IoT scenario, the project was aimed at making real-time fault-detection possible, thus lessening the power restoration time.

My contributions were:

- i. development of an outage-management module which would sense voltages at strategic nodes in the grid & relay any changes in state to a utility head-end**
- ii. calculating the theoretical decrease in the effective utility response-time upon deployment of said modules**

Skills

Microfabrication: Molecular Beam Epitaxy, photolithography, sputtering, reactive-ion etching

Characterisation: RHEED, AFM, ellipsometry, photoluminescence

Languages: English, Bengali, Hindi, French

Conferences/presentations/publications

Presentations & publications

K. Grossklaus, J. Ganguly, M. Stevens, J. McElearney, T.Vandervelde, "Examining the Effects of Strain and TI Content on the Properties and Structure of TlGaAs Films," 34th North American Molecular Beam Epitaxy Conference (NAMBE), Banff, Alberta, Canada, Sept. 30th, 2018. (Conference presentation)

J. Ganguly, "End-to-End Integrated Power Outage/Restoration Sensing Module," IEEE International Conference on Innovations in Information Embedded and Communication Systems (ICIIECS), Coimbatore, TN, India, March 19th 2015. DOI: 10.1109/ICIIECS.2015.7192785

Workshops attended

Neuro-mimetic emerging nano-devices (Dr. V. Saxena, Uni. Idaho) & Nano-electrode arrays for scalable inter-cellular electrophysiology (Dr. D. Ham, Harvard), 60th IEEE International Midwest Symposium on Circuits and Systems (MWSCAS), Medford MA, Aug. 6-9th, 2017

Experience

Co-curricular research exposure

Graduate Research Assistant (Tufts University, MA; April '17 - May '18)

Summer Research Intern (New Jersey Institute of Technology, NJ; Summer '15)

Summer Intern (CESC Ltd, India; Summer '14)

Extra-curricular exposure

Course de communicatif en Français (R.K.M. Institute of Culture, India; Spring '19)

Graduate Resident Director (Tufts University, MA; Sept. '16 - Aug. '17)

English Teacher & Summer Exchange Student (AIESEC Thailand; Summer '13)

References

Dr. Kevin Grossklaus, Research Advisor, Tufts University

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Dr. Brian F. Aull, Professor/Technical Staff Member, Tufts U./MIT Lincoln Labs

(aull@ll.mit.edu);

Dr. Anindya Sen, Undergraduate Advisor, Heritage Institute of Technology

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