Somaiah Nalla, Ph.D.

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PROFESSIONAL SUMMARY:

Materials researcher with experience in thin film deposition, device fabrication, class 100 clean room, electrical and microstructural characterization.

Research experience in Semiconductor devices and microelectronic device reliability problems.

EDUCATION:

Ph.D in Materials Engineering	2018
Indian Institute of Science, Bangalore, India	
M.Tech in Materials Engineering	2011
University of Hyderabad, Gachibowli, Hyderabad, India	
M.Sc in Physics	2008
University College of Science, Osmania University, Hyderabad	
B.Sc. with Mathematics, Physics, and Statistics	2005
P.G. College of Science, Saifabad, Osmania University, Hyderabad	

TECHNICAL SKILLS:

Thin film deposition: Magnetron sputtering, thermal evaporation
Device Fabrication: Photolithography, Rapid thermal annealing, Plasma etching, wet chemical etching, wet chemical benches
Characterization: SEM, TEM, XRD, AFM, optical microscope, electrical measurement
Modeling and Software: TCAD Sentaurus, COMSOL Multiphysics, Origin, Kaleida Graph

RESEARCH EXPERIENCE:

Indian Institute of Science, Center for Nano Science and Engineering
Postdoctoral Research Associate: April 2023 – present
Research topic: β-Ga₂O₃ based power electronic devices
Senior Project Associate in Materials Engineering: October 2022- March 2023
Role and responsibilities: Focused on electromigration in metallic thin film, Mentoring research scholars

Rice University, Department of Electrical and Computer Engineering, Texas, US Postdoctoral Research Associate: September 2021 - June 2022 Research topics: Tunable optical properties of 2D materials and 2D materials-based Quantum Emitters

Indian Institute of Science, Department of Materials Engineering, Bangalore, India

Research Associate: December 2020 - March 2021

Studied Electromigration-thermomigration coupling on mass transport in width varied Cu thin film interconnects

Project Associate: July 2018 - January 2020

Studied the effect of thermomigration-electromigration coupling on mass transport in Cu film deposited on W/SiO₂/Si and Ta/ SiO₂/Si.

Ph. D Scholar: August 2011 - April 2018

Thesis title: "Mass Transport in Cu-Interlayer-Si Systems under Various Types of Thermo-Electro- Mechanical Excursions"

Understanding mass transport in Cu thin film interconnects and related reliability issues arising from the thermomigration-electromigration coupling and thermal cycling effects

University of Hyderabad, Department of Materials Engineering

Master of Technology: August 2009 – July 2011

Thesis title: *"Investigation of Magnetic and Magneto elastic properties of Zn doped Cobalt ferrite"* Investigated the effect of Zn substitution on the magnetic and magnetoelastic properties of cobalt ferrite.

LABORATORY SETTING UP EXPERIENCE:

Role and Responsibilities:

- Involved in lab setup from scratch to designing and assembling of various electrical measurements setups (e.g., high precision solid electromigration and liquid electromigration set up)
- Thin film deposition systems
- Environmental chamber for thermal cycling (between -70 to 180 °C) and humidity control
- Vacuum sealing setup and other miscellaneous.

TEACHING EXPERIENCE:

Teaching Assistant ship (2014-2015): Undergraduate program, Indian Institute of Science, Bangalore **Physics Lecturer (Aug 2008 - April 2009)**: Siddhartha Postgraduate College, Hyderabad.

• Taught MSc Materials Science courses

AWARDS AND ACHIEVEMENTS:

- Ministry of Human Resource Development Research Fellowship (Govt. of India), 2011-2016
- Won 3rd prize for SEM micrograph, Annual Dept. Student symposium, IISc-2017
- Qualified GATE 2009
- Qualified JEST 2008 National Level examination
- Stood 1st in 12th and 10th standards at Govt. Junior College and at ZP High School, Nalgonda, Telangana

PUBLICATIONS:

- T. Saquib, F. Akyol, H. Ozden, N. Somaiah, J. Sahoo, R. Muralidharan, D.N. Nath "*Carrier transport in LPCVD grown Ge-DOPED* β-Ga₂O₃/4H-SiC isotype heterojunction" J. Appl. Phys. 135, 065701 (2024)
- 2. **Nalla Somaiah,** Anwesha Kanjilal and Praveen Kumar "*Effects of Interfacial Layer on Stress Relaxation Mechanisms Active in Cu-Si Thin Film System during Thermal Cycling*" **MRS Communications** 10, 164 (2020)
- 3. Nalla Somaiah and Praveen Kumar "Effect of Thermomigration-Electromigration Coupling on Mass Transport in Cu Thin Films" Journal of Electronic Materials 49, 96 (2020)
- 4. **Nalla Somaiah** and Praveen Kumar *"Tuning Sample Length Effect on Mass Transport in Current Carrying Cu-Si Thin Film Systems via Interfacial Engineering"* **Nanotechnology** 30, 485704 (2019)
- 5. **Nalla Somaiah** and Praveen Kumar *"Tuning Electromigration-Thermomigration Coupling in Cu/W Blech Structures"* **J. Appl. Phys.** 124, 185102(2018)
- Deepak Sharma, Aman Jain, Nalla Somaiah, Ramesh Narayan P. and Praveen Kumar "Graphene Embedded 2- Phase In-Cu Solders: A Potential Next Generation Metallic Thermal Interface Material" J. Elec. Mater. 47, 4177 (2018)
- 7. Nalla Somaiah and Praveen Kumar "Inverse Blech Length Phenomenon in Thin-Film Stripes" Phys. Rev. Appl. 10, 054052 (2018)
- 8. Nalla Somaiah, Deepak Sharma and Praveen Kumar "*Electric current induced forward and anomalous backward mass transport*" J. Phys. D: Appl. Phys. 49, 20LT01 (2016)
- 9. S Talukder, **N Somaiah**, P Kumar "*Effect of substrate surface roughness on electric current induced flow of liquid metals*" **Appl. Phys. Let.** 102 (5),054101(2013)
- 10. **N Somaiah**, TV Jayaraman, PA Joy, D Das "*Magnetic and Magnetoelastic Properties of Zn-doped Cobalt Ferrites-* $CoFe_{2-x}Zn_xO_4$ (x = 0, 0.1, 0.2, and 0.3)" **J. Magn. Magn. Mater.** 324, 2286 (2012)

CONFERENCE PROCEEDINGS:

 Nalla Somaiah and Praveen Kumar "Observation of Inverse Blech effect during the electromigration" International Journal of Electronics and Communication Engineering Vol:4, No:7, 2017, Proc. 19th International Conference on Microelectronics and Microsystems Technology (ICMMT), Zurich Switzerland 19 (7 - Part XVII) (2017) 2142 (Abstract)

PRESENTATION AND TALKS:

 "Impact of Current Crowding on Mass Transport in Cu interconnect and Observation of Anomalous Backward Mass Transport", 29th Annual Students symposium, 21-22 January 2016, Department of Materials Engineering, IISc, Bangalore

EXTRA-CURRICULAR ACTIVITIES:

- Chess champion 2008, University College of Science, Osmania University
- Part of winning 2nd place in Cricket tournament at university college of science, Osmania University, 2008
- Part of winning team in Cricket tournament at university level, Osmania University, 2007 (Organized by ABVP Osmania University)
- Student representative from ZP High School