

Siddharth Ravichandran

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EDUCATION

PHD IN ECE

GEORGIA TECH
Atlanta, GA | March 2021

MASTER'S IN ECE

RUTGERS UNIVERSITY
New Brunswick, NJ | May 2016

BACHELOR'S IN ECE

COLLEGE OF ENGINEERING
GUINDY, ANNA UNIVERSITY
Chennai, India | May 2013

COURSEWORK

DESIGN

Electronic Systems Packaging
Microwave Design
Semiconductor Devices
RF IC Design
CAD for VLSI

PROCESS

Microelectronics Packaging
Substrate Fabrication
MEMS Devices
CMOS Fabrication

SKILLS

SOFTWARE

MATLAB • HSPICE • ANSYS
(HFSS, Mechanical) • Keysight
ADS • AutoCAD • Cadence
Virtuoso • Zuken CR8000 •
Solidworks

CLEANROOM

lithography • ps & fs laser
machining • Sputtering • e-Less &
electrolytic metallization •
flip-chip assembly • molding

CHARACTERIZATION

VNA and TDR • thermal cycling &
shock testing • shadow Moiré •
drop test • x-ray • SEM

EXPERIENCE

PACKAGING RESEARCH CENTER, GEORGIA TECH

GRADUATE RESEARCHER; ADVISOR: PROF. RAO TUMMALA
Sep 2016 – Present | Atlanta, GA

- Currently leading the Glass Fanout program in an industry consortium with 40+ companies; developed 3 novel packaging technologies for heterogeneous integration.

ADVANCED MICRO DEVICES (AMD)

SUMMER INTERN; ADVANCED PACKAGING
May 2020 – Present | Austin, TX

- Investigated advanced 2.5D & 3D chiplet integration for a roadmap HPC product; working with IP vendors & OSATs to establish a technology demonstration path.
- Designed substrate-integrated thin-film capacitors and optimized bump matrix for improving power delivery to GPUs.

EXPERTISE

PACKAGE DESIGN

- In-depth knowledge of various single- & multi-chip package architectures
- Experienced in transmission line theory and SI/PI modeling; EM simulation of interconnects, vias, RF passives and module design.

SUBSTRATE FABRICATION & ASSEMBLY

- Skilled in cleanroom fabrication processes, including RDL (redistribution layer) technologies like photolithography, Copper metallization, build-up layer lamination, via formation, surface finish, BGA (ball grid array) balling, etc.
- Adept in design and development of microelectronics assemblies at chip and board level, underfilling, reliability testing, and failure analysis

RESEARCH

Glass based Panel Fanout Technology for Heterogeneous Integration

Designed and demonstrated a non-TSV 3D package architecture for logic-memory integration using low-cost glass-based fanout approach achieving 2.5x better bandwidth & power-efficiency with 28% better thermal performance than current approaches.

2.5D Glass Interposer for High-Performance Computing

Designed 50x40 mm glass-based interposer package for manufacturability and reliability for ≥ 1 TB/s/mm bandwidth densities with 8 metal-layers at 35 μ m FLI and 800 μ m BGA.

140GHz transmit modules for 6G infrastructure

Extended the baseline glass fanout technology to develop D-band transmit modules with <0.1 dB/mm interconnects using air-filled SIWs and supporting 100 W/cm² thermal flux.

Architectural and material benchmarking for bandwidth and power efficiency

Benchmarked 2.5D and 3D high-density interconnects by studying impact of design parameters including process and material induced limitations and variations.

AWARDS

2020	Ph.D. Fellowship Award	IEEE Electronics Packaging Society
2019	Packaging Vision Award	IEEE Electronics Packaging Society
2019	Panelist - Future of Packaging	ECTC 2019, Las Vegas, NV
2018	Best Student Paper	IMAPS 2018, Pasadena, CA

PATENTS

1. GTRC8061PCT: S.Ravichandran, et al. "Molded Glass Panel Embedding", 2018. (Status - Currently being filed as PCT)
2. GTRC7842PRV: S.Ravichandran, et al. "3D Embedded Package for Heterogeneous Integration", 2018 (Status: Provisional)
3. GTRC7753PRV: B.DeProspo, C.Nair, S.Ravichandran, et al. "2.5D High-density Fan-out", 2017 (Status: Provisional)

PUBLICATIONS

BOOK CHAPTERS

1. Siddharth Ravichandran, Rao Tummala, et al. "Systems Packaging Applications: Flexible Electronics". Fundamentals of Device and Systems Packaging: Technologies and Applications, Second Edition. McGraw-Hill (2019)
2. Siddharth Ravichandran and Rao Tummala. "Systems Packaging Applications: Smartphones". Fundamentals of Device and Systems Packaging: Technologies and Applications, Second Edition. McGraw-Hill (2019)
3. Subramaniam Iyer, Siddharth Ravichandran, et al. "3D ICs". Fundamentals of Device and Systems Packaging: Technologies and Applications, Second Edition. McGraw-Hill (2019)

JOURNAL PAPERS

1. Siddharth Ravichandran, et al. "Design and demonstration of Glass Panel Embedding for 3D System Packages for heterogeneous integration applications." Journal of Microelectronics and Electronic Packaging (2019)
2. Fuhan Liu, Siddharth Ravichandran, et al. "Low Cost One Micron Photolithography Technologies for Large Body Size, Low Resistance Panel-Based RDL." IEEE Transactions on Components, Packaging and Manufacturing Technology (2019)
3. Zihan Wu, Siddharth Ravichandran, et al. "3D Integrated High-Precision Passives on Thin Glass Substrates for Miniaturized and High-Performance RF Components." Journal of Microelectronics and Electronic Packaging (2018)

CONFERENCE PAPERS

1. Siddharth Ravichandran, et al. "Low-Cost Non-TSV Based 3D Packaging Using Glass Panel Embedding (GPE) for Power-Efficient, High-Bandwidth Heterogeneous Integration." 2019 IEEE ECTC
2. Siddharth Ravichandran, et al. "Packaging Approaches for THz Communication" 2019 IEEE IMC-5G
3. Siddharth Ravichandran, et al. "2.5 D Glass Panel Embedded (GPE) Packages with Better I/O Density, Performance, Cost and Reliability than Current Silicon Interposers and High-Density Fan-Out Packages" 2018 IEEE 68th ECTC
4. Nobuo Ogura, Siddharth Ravichandran, et al. "First Demonstration of Ultra-Thin Glass Panel Embedded (GPE) Package with Sheet Type Epoxy Molding Compound for 5G/mm-wave Applications" 2019 IMAPS
5. Martin Letz, Siddharth Ravichandran, et al. "Attenuation of high Frequency Signals in Structured Metallization on Glass: Comparing Different Metallization Techniques with 24 GHz, 77 GHz and 100 GHz Structures" 2019 IEEE 69th ECTC
6. T.Shi, S. Ravichandran, et al. "Automotive Radar with SiGe Devices and Glass Panel Embedding (GPE)" 2018 IEEE ECTC
7. Rao Tummala, Siddharth Ravichandran, et al. "Heterogeneous & homogeneous package integration at device and system levels" 2018 PanPacific Microelectronics Symposium (PanPac 2018)
8. Martin Letz, Siddharth Ravichandran, et al. "Structured metallization on glass: A comparative study of resonance and propagation characteristics at 24GHz" 2018 Nordic Conference on Microelectronics Packaging (IMAPS-Nordic 2018)
9. Rao Tummala, Siddharth Ravichandran, et al. "Glass Panel Packaging, as the most leading-edge packaging: Technologies and Applications" 2020 PanPacific Microelectronics Symposium (PanPac 2020)
10. Siddharth Ravichandran, et al. "Design and Demonstration of Large-body sized Glass-based Active Interposer for High Performance Computing" (2020 IEEE ECTC)
11. Mutee Rehman, Siddharth Ravichandran, et al. "W-band and D-band Transmission Lines on Glass Based Substrates for Sub-THz Modules" (2020 IEEE ECTC)
12. A.Watanabe, S.Ravichandran, et al. "Glass-Based IC-Embedded Antenna-Integrated Packages for 28-GHz High-Speed Data Communications" (2020 IEEE ECTC)
13. Ryan Wong, Siddharth Ravichandran, et al. "Thermal Management of Multi-Chip Glass Panel Embedded Packages: Package Architecture vs. Heat Flux Density" (2020 IEEE ECTC)
14. Fuhan Liu, Siddharth Ravichandran, et al. "Advances in High Performance RDL Technologies for Enabling IO Density of 500 IOs/mm/layer and 8- μ m IO Pitch Using Low-k Dielectrics" (2020 IEEE ECTC)