OMKAR GUPTE

3D Systems Packaging Research Center, Atlanta GA | ogupte3@gatech.edu | +1 (734) 709 0229

PROFESSIONAL OVERVIEW

- Experienced in fundamentals, design and development of microelectronics assemblies at chip and board levels, reliability testing, failure analysis and electroless plating formulation. Knowledgeable in underfill process development, polymer synthesis, characterization, polymer coatings formulation, blends, composites.
- Experienced in cleanroom fabrication processes, including RDL (redistribution layer) technologies like photolithography, embedded traces, glass panel embedding, SAP (semi-additive process)/subtractive etching methods for conductor metallization, build-up layer lamination and via formation.

EDUCATION

Georgia Institute of Technology, Atlanta GA, USA

Doctor of Philosophy (Ph.D.), Materials Science and Engineering — *Expected Feb 2021*

Thesis Advisor: Prof. Rao Tummala; GPA: 4.0/4.0

University of Michigan, Ann Arbor MI, USA

Master of Science (M.S.), Macromolecular and Materials Science and Engineering — *Dec 2016*

Thesis Advisor: Dr. Anish Tuteja; GPA: 4.0/4.0

Institute of Chemical Technology, Mumbai, India

Bachelor of Technology, Polymer Engineering and Technology; GPA: 9.08/10 — *May 2015*

EXPERIENCE

Intel Corporation, Chandler AZ | *Summer Intern* — *May 2020 – August 2020*

Underfill and Mold compound process development in Assembly/Test and Technology Development (ATTD)

Georgia Institute of Technology, Atlanta GA | *Advisor: Prof. Rao R. Tummala* — *Jan 2017 - Present*

Design and Demonstration of Socketable Ball Grid Arrays (BGAs)

- Performed extensive diffusion modeling and analysis for material selection and characterization for multi-layered coatings on solder spheres
- Developed electroless deposition processes for multiple metals on solder spheres
- Performed finite element modeling for thermomechanical reliability and warpage control in board-level interconnections for 2.5D systems and contact modeling for socketable BGAs

Reliability analysis and failure mode detection of 28 nm Flip-chip chip scale package (FCCSP)

- Extensive reliability testing of CSP using thermal cycling and liquid-liquid thermal shock
- Performed predictive failure modeling of CSP package architecture and analyzed failure modes in the package using electrical characterization, X-Ray and C-SAM with statistical analysis

Reliability of Redistribution Layer (RDL) in 2.5D Glass Interposer Packages

- Fabricated and characterized multi-layered redistribution layer (RDL) on glass and silicon substrates with microvias and fine lines with 2μm line and space.
- Focus on thermo-mechanical adhesion reliability for polymer dielectric and metal interfaces, copper trace electrochemical migration reliability with ultra-thin film dielectrics and microvia reliability for dry film photosensitive dielectrics

Embedded Traces for 1.5μm RDL on 2.5D glass interposers

- Fabricated substrates and optimized the process to achieve high-density structures using via-in-trench approach using panel scalable dielectrics. Evaluated the dimensional stability of 4-metal layered glass package substrate

University of Michigan, Ann Arbor MI — *Sep 2015 – Jan 2017*

Smooth Durable Omniphobic Coatings with Enhanced Mechanical Durability

- Formulated combination coatings of fluorinated and non-fluorinated silanes to achieve solid and liquid repellency on the fabrics by dip coating and spray coating techniques. Optimized the formulation and reduced the cost by 30%

- Formulated a smooth omniphobic coating for hard surfaces. Blended F-POSS (fluorinated polyhedral oligomeric silsesquioxane) with other polymers to impart hydrophobicity; improved the mechanical durability of the coatings by more than 300%

Institute of Chemical Technology, Mumbai, India *June 2014 – April 2015*

Synthesis and Characterization of Polyaniline Nanofibers

- Synthesized Polyaniline nanofibers by interfacial polymerization by varying monomer to oxidant ratio. Determined the optimum ratio & reaction conditions to achieve high conductivity

Pidilite Industries Limited, Mumbai, India *May 2014 – July 2014*

- Developed methods to reduce foaming by more than 50% in one component polyurethane adhesives. Formulated polychloroprene rubber based adhesive for foam-wood bonding. Improved adhesion by more than 100%

Indian Institute of Technology (IIT) – Bombay, Mumbai, India *May 2013 – July 2013*

- Studied the interaction between Polydimethylsiloxane (PDMS) and glass; varied normal load and sliding speed to study the bonding-debonding of polymer chains to the glass

TECHNICAL SKILLS

Characterization:	Proficient in SEM/EDX, XPS, DSC, FTIR, XRD, AFM, X-Ray, Goniometry, HAST, thermal cycling, thermal shock, drop test, C-SAM, Shadow Moire Warpage
Cleanroom :	Proficient in electroless and electrolytic metal deposition, ultra-thin dielectric film lamination, PVD Sputtering, Plasma RIE, metal etching
Assembly :	Proficient in solder paste printing and mass reflow, flip-chip bonding and pick and place reflow assemblies and familiar with thermocompression bonding
Software :	ANSYS Workbench, JMP, AutoCAD, Solidworks, Matlab

PUBLICATIONS, CONFERENCES AND BOOK CHAPTERS

1. **Gupte, O**., et al 2019. Effect of solder paste volume and reflow parameters on solder paste wicking and joint shear strength of Ni-Au coated Cu spheres. *IEEE Transactions on Components, Packaging and Manufacturing Technology, vol. 10, no. 5, pp. 828-835, May 2020, doi: 10.1109/TCPMT.2019.2960382.*
2. **Gupte, O**., et al. 2019, May. Innovative Socketable and Surface-Mountable BGA Interconnections. In *2019 IEEE 69th Electronic Components and Technology Conference (ECTC)* (pp. 1028-1034). IEEE.
3. **Gupte, O.,** et al. 2019, January. Solder paste wicking in socketable BGAs. In *Additional Conferences (Device Packaging, HiTEC, HiTEN, & CICMT)* (Vol. 2019, No. DPC, pp. 000429-000452). International Microelectronics Assembly and Packaging Society.
4. Tummala R., Iyer, S., **Gupte, O.** et al. Fundamentals of 3D packaging with and without TSV. *In Fundamentals of Device and Systems Packaging, McGraw Hill, pp. 407-440*
5. Boban, M., **Gupte, O**. et al. 2018. Smooth, All-Solid, Low-Hysteresis, Omniphobic Surfaces with Enhanced Mechanical Durability. *ACS applied materials & interfaces*, *10*(14), pp.11406-11413.

AWARDS AND ACTIVITIES

- Vice chair and founding member – IEEE EPS Student Chapter at Georgia Tech
- Jewell Family Fellowship for scholarly accomplishments during graduate school
- Gold medal for all-round excellence throughout undergraduate term
- ‘ICT Alumni Association First Prize for Best Student in Penultimate Year’ award in 2014
- Taught courses on ‘Materials laboratory’, ‘Microelectronics assembly’ at Georgia Tech and ‘Composite materials’ at Michigan
- Organized and participated in outreach events in Michigan, teaching basics of polymers and their applications to middle and high school students
- Worked with G.O.D.S Foundation NGO in Mumbai to teach music to the differently-abled