# Rui Zhang

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## Skills

**Modeling and Design**
- Wave optics module and thermal mechanical module in COMSOL.
- Fresnel diffraction and Gaussian beam simulation in MATLAB.

**Fabrication and Characterization**
- Packaging and semiconductor fabrication processes such as photolithography, thin film deposition, dry film lamination, and copper plating.
- Characterization tools such as VLM, SEM, EDX, CSAM, TEM, XRD, UV-Vis, FTIR, and ellipsometry.

**Miscellaneous**
- Microsoft Office, AutoCAD, LaTeX.

## Education

**Geoogia Institute of Technology** **Atlanta, GA US**
*Doctor of Philosophy (PhD) in Electrical and Computer Engineering* *08/2015 – present*
GPA 4.0

**University of Florida** **Gainesville, FL US**
*Master of Science (MS) in Materials Science and Engineering* *08/2013 – 05/2015*
GPA 3.9, Achievement Award

**Tsinghua University** **Beijing, CN**
*Bachelor of Engineering (BE) in Materials Science and Engineering* *08/2009 – 07/2013*
GPA 3.5, Honor with Excellence in EDA Practice, Honor with Excellence in Electronic Technology Practice

## Work Experience

**Toyota Research Institute** **Ann Arbor, MI US**
*Internship* *05/2018 – 08/2018*
- Modeled fundamental silicon photonic components for solid state LIDAR system.
- Fabricated resistive heaters for jet impingement cooling system.

**SAE Magnetics** **Dongguan, CN**
*Internship* *08/2012 – 09/2012*
- Trained and qualified as entry-level engineer.
- Learned the fabrication process of magnetic recording head for hard disk drives.

## Research Experience

**Graduate Research Assistant** **Atlanta, GA US**
*Dr. Rao R. Tummala, 3D Systems Packaging Research Center, Georgia Institute of Technology* *08/2015 – present*
- **Project** Ultra–small microvias and through glass vias (TGVs) by laser ablation
  - Developing microvias with sub–micron diameters by picosecond laser ablation in low loss dielectric polymers.
  - Optimizing high aspect ratio TGV fabrication by femtosecond laser ablation for high density interconnects.
- **Project** BCB–based photoimageable dielectric polymer for photonics and 2.5D packaging
  - Designed and fabricated BCB–based circular core single mode waveguides.
  - Developed the fabrication process for ultra–fine line and space structures for 2.5D RDL applications.
- **Project** 3D glass photonics with single–mode fiber integration
  - Demonstrated v–groove chips with fiber integration on glass substrates for precise fiber positioning.
  - Optimized the fabrication process to eliminate material residues, wrinkles and other defects.

**Graduate Research Assistant** **Gainesville, FL US**
*Dr. Huikai Xie, Interdisciplinary Microsystems Group, University of Florida* *07/2014 – 05/2015*

- **Project** Performance study of micromirrors
  - Simulated the thermal–mechanical relationship of micromirrors.
  - Improved device characteristics and achieved higher than 1 kHz mechanical response.

**Research Assistant** **Beijing, CN**
*Dr. Liangliang Li, State Key Laboratory of New Ceramics and Fine Processing, Tsinghua University* *06/2011 – 07/2013*

- **Project** Test, analysis and application of Sn–Bi solder paste as a thermal interface material
  - Reduced the thermal resistance of Sn–Bi solder as a thermal interface material down to less than $5\,\mathrm{mm^2K/W}$.
  - Studied the reliability by thermal cycling and proved that Sn–Bi solder could be a promising candidate for thermal interface materials used for power electronics.
  - Developed a model to predict the performance of various solder pastes used as thermal interface materials.
- **Project** Silver-based thermal interface materials with low thermal resistance
  - Synthesized silver nano–particles with a precise size range of 20–30 nm.
  - Conducted characterizations on thermal transport properties and morphologies.

## Publications


- **Zhang, R.**, Liu, F., Kathaperumal, M., Tummala, R. R., & Swaminathan, M. (2020). Co–Integration of Single Mode Waveguides and Embedded Electrical Interconnects for High Bandwidth Communications. *IEEE Transactions on Components, Packaging and Manufacturing Technology*, 10(3), 393–399.
- Liu, F., Khurana, G., **Zhang, R.**, Watanabe, A., DeProspo, B. H., Nair, C., ... & Swaminathan, M. (2019). Innovative Sub–5–$\mu$m Microvias by Picosecond UV Laser for Post–Moore Packaging Interconnects. *IEEE Transactions on Components, Packaging and Manufacturing Technology*, 9(10), 2016–2023.
- Chou, B., Chang, G., Guidotti, D., **Zhang, R.** (2019). Chapter 12 Fundamentals of Optoelectronics Packaging. in *Fundamentals of Device and System Packaging: Technologies and Applications* (2nd ed.). New York, NY: McGraw–Hill Education.
- **Zhang, R.**, Liu, F., Gallagher, M., Anzures, E., Sundaram, V., & Tummala, R. (2018, May). Co–integration of High–Bandwidth Photonic and Electronic RDL on 2.5 D Glass Interposers Using Low Optical Absorption Photoimageable Dielectric Polymer. In *Electronic Components and Technology Conference (ECTC), 2018 IEEE 68th* (pp. 1130–1135). IEEE.
- Liu, F., Ito, H., **Zhang, R.**, DeProspo, B. H., Benthaus, F., Akimaru, H., ... & Tummala, R. R. (2018, May). Low cost panel–based 1–2 micron RDL technologies with lower resistance than Si BEOL for large packages. In *Electronic Components and Technology Conference (ECTC), 2018 IEEE 68th* (pp. 613–618). IEEE.
- Liu, F., Nair, C., Kubo, A., Ando, T., Lu, H., **Zhang, R.**, ... & Tummala, R. R. (2017, May). Via-in-Trench: A Revolutionary Panel–Based Package RDL Configuration Capable of 200–450 IO/mm/Layer, an Innovation for More–Than–Moore System Integration. In *Electronic Components and Technology Conference (ECTC), 2017 IEEE 67th* (pp. 2097–2103). IEEE.
- **Zhang, R.**, Liu, F., Sundaram, V., & Tummala, R. (2017, May). First Demonstration of Single–Mode Polymer Optical Waveguides with Circular Cores for Fiber–to–Waveguide Coupling in 3D Glass Photonic Interposers. In *Electronic Components and Technology Conference (ECTC), 2017 IEEE 67th* (pp. 1606–1611). IEEE.
- Zhang, X., Koppal, S. J., **Zhang, R.**, Zhou, L., Butler, E., & Xie, H. (2016). Wide–angle structured light with a scanning MEMS mirror in liquid. *Optics Express*, 24(4), 3479–3487.
- Zhang, X., **Zhang, R.**, Koppal, S., Butler, L., Cheng, X., & Xie, H. (2015, June). MEMS mirrors submerged in liquid for wide–angle scanning. In *Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS), 2015 Transducers-2015 18th International Conference on* (pp. 847–850). IEEE.
- **Zhang, R.**, Cai, J., Wang, Q., Li, J., Hu, Y., Du, H., & Li, L. (Feb. 2014). Thermal resistance analysis of Sn–Bi solder paste used as thermal interface material. *Journal of Electronic Packaging*, 136(1), 011012 1–5
- Yu, H., **Zhang, R.**, Li, L., Mao, X., & Du, H. (Aug. 2012). Silver–based thermal interface materials with low thermal resistance. In *Electronic Packaging Technology and High Density Packaging (ICEPT-HDP), 2012 13th International Conference on* (pp. 410–413). IEEE.