

Stanford



Mohamadali Malakoutian

Postdoctoral Scholar, Electrical Engineering

Bio

BIO

Mohamadali is an experienced Postdoctoral researcher at Stanford University with a demonstrated history of working in high-power high-frequency transistors, all-diamond diodes, and diamond integration for thermal management, III-V wide bandgap semiconductors, integrated microsystems including MEMS/NEMS devices, and microfluidic channels. He is an expert in fab process design-integration, process and device modeling (Athena, Atlas), thin-film deposition techniques (Evaporation, Sputtering, PVD, ALD, and PECVD), dry etching (ICP/RIE etching of Diamond, AlN, SiN, Al₂O₃, SiO₂), wet etching (bulk Si micromachining), and single-crystalline/polycrystalline diamond growth. He is currently working on the growth, fabrication, and characteristics of GaN HEMTs with diamond integrated for thermal management to solve the self-heating problem of mm-wave devices.

HONORS AND AWARDS

- TECHCON 2023 Best Presenter Award, Semiconductor Research Corp. (SRC) (September 2023)
- TECHCON 2022 Best Presenter Award, Semiconductor Research Corp. (SRC) (September 2022)

PROFESSIONAL EDUCATION

- Bachelor of Science, University Of Tehran (2009)
- Master of Science, University Of Tehran (2012)
- Doctor of Philosophy, University of California Davis (2020)
- PhD, University of California , Electrical Engineering (2020)

STANFORD ADVISORS

- Srabanti Chowdhury, Postdoctoral Faculty Sponsor

Publications

PUBLICATIONS

- **Development of 300-400 °C grown diamond for semiconductor devices thermal management** *MRS ADVANCES*
Malakoutian, M., Soman, R., Woo, K., Chowdhury, S.
2023
- **SRC-led materials research: 40 years ago, and now** *MRS ADVANCES*
Zhirnov, V., Chen, M. E., Malakoutian, M., Margavio, H. M., Pawliczak, E., Reidy, K., Yanez, W., Younkin, T.
2023
- **Thermal Scaffolding for Ultra-Dense 3D Integrated Circuits**
Rich, D., Kasperovich, A., Malakoutian, M., Radway, R. M., Hagiwara, S., Yoshikawa, T., Chowdhury, S., Mitra, S., IEEE

IEEE.2023

- **Impact of Diamond Passivation on f(T) and f(max) of mm-wave N-Polar GaN HEMTs** *IEEE TRANSACTIONS ON ELECTRON DEVICES*
Zhou, X., Malakoutian, M., Soman, R., Bian, Z., Martinez, R., Chowdhury, S.
2022
- **Low Thermal Budget Growth of Near-Isotropic Diamond Grains for Heat Spreading in Semiconductor Devices** *ADVANCED FUNCTIONAL MATERIALS*
Malakoutian, M., Zheng, X., Woo, K., Soman, R., Kasperovich, A., Pomeroy, J., Kuball, M., Chowdhury, S.
2022
- **Current Transient Spectroscopic Study of Vacancy Complexes in Diamond Schottky p-i-n Diode** *IEEE TRANSACTIONS ON ELECTRON DEVICES*
Chaudhuri, S. K., Malakoutian, M., Kleppinger, J. W., Dutta, M., Koeck, F. A., Nemanich, R. J., Chowdhury, S., Mandal, K. C.
2022
- **A study on sub-bandgap photoexcitation in nitrogen- and boron-doped diamond with interdigitated device structure** *APPLIED PHYSICS LETTERS*
Woo, K., Malakoutian, M., Reeves, B. A., Chowdhury, S.
2022; 120 (11)
- **Record-Low Thermal Boundary Resistance between Diamond and GaN-on-SiC for Enabling Radiofrequency Device Cooling.** *ACS applied materials & interfaces*
Malakoutian, M., Field, D. E., Hines, N. J., Pasayat, S., Graham, S., Kuball, M., Chowdhury, S.
2021
- **Demonstration of Monolithic Polycrystalline Diamond-GaN Complementary FET Technology for High-Temperature Applications** *ACS APPLIED ELECTRONIC MATERIALS*
Ren, C., Malakoutian, M., Li, S., Ercan, B., Chowdhury, S.
2021; 3 (10): 4418-4423
- **Diamond-Incorporated Flip-Chip Integration for Thermal Management of GaN and Ultra-Wide Bandgap RF Power Amplifiers** *IEEE TRANSACTIONS ON COMPONENTS PACKAGING AND MANUFACTURING TECHNOLOGY*
Shoemaker, D., Malakoutian, M., Chatterjee, B., Song, Y., Kim, S., Foley, B. M., Graham, S., Nordquist, C. D., Chowdhury, S., Choi, S.
2021; 11 (8): 1177-1186
- **Development of Polycrystalline Diamond Compatible with the Latest N-Polar GaN mm-Wave Technology** *CRYSTAL GROWTH & DESIGN*
Malakoutian, M., Ren, C., Woo, K., Li, H., Chowdhury, S.
2021; 21 (5): 2624-2632
- **Polycrystalline diamond growth on beta-Ga₂O₃ for thermal management** *APPLIED PHYSICS EXPRESS*
Malakoutian, M., Song, Y., Yuan, C., Ren, C., Lundh, J., Lavelle, R. M., Brown, J. E., Snyder, D. W., Graham, S., Choi, S., Chowdhury, S.
2021; 14 (5)
- **Diamond Integration on GaN for Channel Temperature Reduction**
Malakoutian, M., Xu, R., Ren, C., Pasayat, S., Sayed, I., Pop, E., Chowdhury, S., IEEE
IEEE.2021: 70-74
- **Analysis of mobility-limiting mechanisms of the two-dimensional hole gas on hydrogen-terminated diamond** *PHYSICAL REVIEW B*
Peterson, R., Malakoutian, M., Xu, X., Chapin, C., Chowdhury, S., Senesky, D. G.
2020; 102 (7)
- **Schottky Barrier Height Analysis of Diamond SPIND Using High Temperature Operation up to 873 K** *IEEE JOURNAL OF THE ELECTRON DEVICES SOCIETY*
Malakoutian, M., Benipal, M., Koeck, F. A., Nemanich, R. J., Chowdhury, S.
2020; 8: 614–18
- **Hydrogen-terminated diamond FET and GaN HEMT delivering CMOS inverter operation at high-temperature**
Ren, C., Malakoutian, M., Li, S., Chowdhury, S., IEEE
IEEE.2020
- **A Study on the First-Derivative Output Properties of GaN Static Induction Transistor with Submicrometer Fin Width** *PHYSICA STATUS SOLIDI B-BASIC SOLID STATE PHYSICS*
Chun, J., Li, S., Malakoutian, M., Ji, D., Chowdhury, S.

2019

● **A Study on the Growth Window of Polycrystalline Diamond on Si₃N₄-coated N-Polar GaN CRYSTALS**

Malakoutian, M., Laurent, M. A., Chowdhury, S.

2019; 9 (10)