

Curriculum Vitae

Daniel MORARU

Dr. Eng., Associate Professor
Shizuoka University

Faculty of Engineering, Dept. of Electronics and Materials Science
Research Institute of Electronics
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EDUCATION BACKGROUND

MBA (Master of Business Administration), E-MBA 2020 batch, **GLOBIS University**, Tokyo, Japan
(graduated Sept. **2022** – **Award for Academic Excellence**)

Dr. Eng., Nanovision Science and Technology, **Shizuoka University**, Japan, **2007**
Thesis: “*Manipulation of electron tunneling in vertical and horizontal silicon nanostructures*”
Coordinator: Prof. M. Tabe

M.Sc., Plasma Physics, **Al. I. Cuza University**, Iasi, Romania, **2003**
Thesis: “*Study of micro-hollow cathode discharges in plasma*”
Coordinator: Prof. L. Biborosch

B.Sc., Physics (Optical spectroscopy and lasers), **Al. I. Cuza University**, Iasi, Romania, **2001**
Thesis: “*Holography and its applications*”
Coordinator: Prof. M. Strat

RESEARCH/TEACHING EXPERIENCE

- Jan. 2015~: **Associate Professor** – Dept. of Electronics and Mater. Sci., Shizuoka Univ.
- Apr. 2012~Dec. 2014: **Specially-appointed Assistant Professor** – Research Institute of Electronics, Shizuoka Univ.
- Oct. 2007~Mar. 2012: **Post-doctoral researcher** – Research Institute of Electronics, Shizuoka Univ.
- Oct. 2004~Sept. 2007: **PhD student** – Graduate School of Electronic Science and Technology, Shizuoka Univ.
- Oct. 2001~Sept. 2004: **Teacher of Physics** (high school and junior high school level), Iasi, Romania

SELECTED PEER-REVIEWED SCIENTIFIC PUBLICATIONS (PAPERS) TOTAL: 74

1. D. Moraru, T. Kaneko, Y. Tamura, T. T. Jupalli, R. S. Singh, C. Pandey, L. Popa, and F. Iacomi, Single-charge tunneling in codoped silicon nanodevices, **Nanomaterials**, Vol. 13, issue 13, pp. 1911_1-15 (2023).
2. T. T. Jupalli, A. Debnath, G. Prabhudesai, K. Yamaguchi, P. Jeevan Kumar, Y. Ono, and D. Moraru, Room-temperature single-electron tunneling in highly-doped silicon-on-insulator nanoscale field-effect transistors, **Applied Physics Express**, Vol. 15, no. 6, pp. 065003 (2022).
3. C. Pandey, G. Prabhudesai, K. Yamaguchi, V N Ramakrishnan, Y. Neo, H. Mimura, and D. Moraru, Electron transport via a few-dopant cluster in the presence of counter-dopants in silicon nanowire transistors, **Applied Physics Express**, vol. 14, issue 5, pp. 055002 (2021)

4. A. Afiff, A. Samanta, A. Udhiarto, H. Sudiby, M. Hori, Y. Ono, M. Tabe, and D. Moraru, *Coulomb-blockade transport in selectively-doped Si nano-transistors*, **Applied Physics Express**, vol. 12, pp. 085004-1-5 (2019).
5. G. Prabhudesai, M. Manoharan, L. T. Anh, H. Mizuta, M. Hori, Y. Ono, M. Tabe, and D. Moraru, *Single-charge band-to-band tunneling via multiple-dopant clusters in nanoscale Si Esaki diodes*, **Applied Physics Letters**, vol. 114, issue 24, pp. 243502-1-5 (2019).
6. H. Firdaus, T. Watanabe, M. Hori, D. Moraru, Y. Takahashi, A. Fujiwara, and Y. Ono, *Electron aspirator using electron-electron scattering in nanoscale silicon*, **Nature Communications**, vol. 5, pp. 4813 (2018).
7. A. Samanta, M. Muruganathan, M. Hori, Y. Ono, H. Mizuta, M. Tabe, and D. Moraru, *Single-electron quantization at room temperature in a-few-donor quantum dot in silicon nano-transistors*, **Applied Physics Letters**, vol. 110, pp. 093107-1-4 (2017).
8. M. Tabe, H. N. Tan, T. Mizuno, M. Muruganathan, L. T. Anh, H. Mizuta, R. Nuryadi, and D. Moraru, *Atomistic nature in band-to-band tunneling in two-dimensional silicon pn tunnel diodes*, **Applied Physics Letters**, vol. 108, pp. 093502-1-4 (2016).
9. A. Samanta, D. Moraru, T. Mizuno, and M. Tabe, *Electric-field-assisted formation of an interfacial double-donor molecule in silicon nano-transistors*, **Scientific Reports (npg)**, vol. 5, pp. 17377 (2015).
10. D. Moraru, A. Samanta, K. Tyszka, L. T. Anh, M. Manoharan, T. Mizuno, R. Jablonski, H. Mizuta, and M. Tabe, *Tunneling in systems of coupled dopant-atoms in Si nanodevices*, **Nanoscale Research Letters**, vol. 10, pp. 372-1-10 (2015) (*Nano Review*).
11. D. Moraru, A. Samanta, L. T. Anh, T. Mizuno, H. Mizuta, and M. Tabe, *Transport spectroscopy of interacting donors in silicon nano-transistors*, **Scientific Reports (npg)**, vol. 4, pp. 6219-1-6 (2014).
12. D. Moraru, A. Udhiarto, M. Anwar, R. Nowak, R. Jablonski, E. Hamid, J. C. Tarido, T. Mizuno, and M. Tabe, *Atom devices based on single dopants in silicon nanostructures*, **Nanoscale Research Letters**, vol. 6, pp. 479-1-9 (2011) (*Nano Review*).
13. D. Moraru, M. Ligowski, K. Yokoi, T. Mizuno, and M. Tabe, *Single-electron transfer by inter-dopant coupling tuning in doped nanowire silicon-on-insulator field-effect transistors*, **Applied Physics Express**, vol. 2, no. 7, pp. 071201 (2009).
14. D. Moraru, Y. Ono, H. Inokawa, M. Tabe, *Quantized-electron transfer through random multiple tunnel junctions in phosphorus-doped silicon nanowires*, **Physical Review B**, vol. 76, no. 7, pp. 075332 (2007).

BOOK CHAPTERS

1. D. Moraru and M. Tabe, in “**Nanoscale Silicon Devices**” (Taylor & Francis Group, edited by S. Oda and D. K. Ferry) – Ch. 8: “*Dopant-Atom Silicon Tunneling Nano-Devices*”, pp. 181-206 (2015).
2. D. Moraru and M. Tabe, in “**Toward Quantum FinFET**” (Springer, edited by W. Han and Z. M. Wang) – Ch. 13: “*Single-electron tunneling transistors utilizing individual dopant potentials*”, pp. 305-324 (2013).
3. M. Tabe, A. Udhiarto, and D. Moraru, in “**Single Atom Nanoelectronics**” (Pan Stanford Publishing, edited by T. Shinada and E. Prati) – Ch. 13: “*Silicon-based single dopant devices and integration with photons*”, pp. 305-327 (2013).
4. M. Tabe and D. Moraru, in “**ナノシリコンの最新技術と応用展開**” (“**Developing Nanosilicon Technology and Device Applications**”) (edited by N. Koshida), Ch.6: “*シングルフォトン検出*” (“*Single photon detection*”) (2010).

SELECTED SCIENTIFIC PRESENTATIONS

TOTAL: >350 CO-AUTHORED PRESENTATIONS/POSTERS, >50 INVITED/PLENARY TALKS

1. (invited talk) D. Moraru, “Challenges and progress in the fabrication of silicon nanowire tunnel diodes”, **5th International Conference on Nano Electronics Research and Education (ICNERE)** (Labuan Bajo, Indonesia), July-Aug. 2023.
2. (plenary talk) D. Moraru, “Single-charge tunneling functionalities in co-doped silicon nanostructures for dopant-based electronics”, **14th International Conference on Physics of Advanced Materials (ICPAM-14)** (Dubrovnik, Croatia - Virtual), Sept. 2022.
3. (invited talk) D. Moraru and T. T. Jupalli, “Transport of electrons one by one through dopants in thin-Si devices”, **29th International Conference on Amorphous and Nano-crystalline Semiconductors (ICANS-29)** (Nanjing University, China & online – hybrid), Aug. 2022
4. (plenary talk) D. Moraru, “Silicon electronics at atomic and molecular scales”, **13th International Conference on Physics of Advanced Materials (ICPAM-13)** (San Feliu de Guixols, Spain & online), Sept. 2021.
5. (invited talk) D. Moraru and G. Prabhudesai, “Band-to-band tunneling in highly-doped silicon-on-insulator nanoscale Esaki diodes”, **6th International Conference on Nanoscience and Nanotechnology (ICONN 2021)** (SRM Institute of Science and Technology, Chennai, India – virtual conference), Feb. 2021.
6. (keynote talk) D. Moraru, “Control and observation of single-electron tunneling via dopants in Si nanoscale devices”, **1st International Symposium on Single Atom Electronics** (University of Michigan-Shanghai Jiao Tong University Joint Institute (JI), Shanghai, China), Oct. 2019.
7. (invited talk) D. Moraru and M. Tabe, “Single-electron tunneling phenomena in silicon nano-transistors with dopant-induced quantum dots”, **IEEE International Microwave, Electron Devices and Solid-State Circuits Symposium (IMESS) 2017** (Penang, Malaysia), Oct. 2017.
8. (invited talk) D. Moraru and M. Tabe, “Single-electron tunneling via dopant-quantum-dots embedded in silicon nano-transistors and nano-diodes”, **6th EM-NANO Conference** (6th International Symposium on Organic and Inorganic Electronic Materials and Related Nanotechnologies) (Fukui), June 2017.
9. (plenary talk) D. Moraru, A. Samanta, and M. Tabe, “Fabrication of Si-based nanoscale transistors and diodes with molecular- and atomic-level functionalities”, **8th International Conference on Advancements in Polymeric Materials (APM 2017)** (Bengaluru, India), Feb. 2017.
10. (invited talk) D. Moraru, A. Samanta, L. T. Anh, M. Manoharan, T. Mizuno, K. Tyszka, R. Jablonski, H. Mizuta, and M. Tabe, “Quantum tunneling in dopant-atom transistors up to room temperature”, **EMN Quantum Meeting** (Phuket, Thailand), Apr. 2016.
11. (invited talk) D. Moraru, A. Samanta, T. Mizuno, and M. Tabe: “Atomic and molecular effects based on dopants in silicon nanodevices”, **International Conference on Small Science (ICSS 2015)** (Phuket, Thailand), Nov. 2015.
12. (invited talk) D. Moraru, A. Samanta, K. Tyszka. L. T. Anh, M. Manoharan, T. Mizuno, R. Jablonski, H. Mizuta, and M. Tabe: “Tunneling via single and coupled dopants in Si nanodevices”, **EMN Meeting on Quantum Technology** (Beijing, China), Apr. 2015.
13. (invited talk) D. Moraru, K. Tyszka, A. Samanta, T. Mizuno, R. Jablonski, and M. Tabe: “Tunneling transport via dopant-induced quantum dots in silicon nano-devices”, **3rd International Conference on Nanoscience and Nanotechnology (ICONN)** (SRM University, Chennai, India), Jan. 2015
14. (invited talk) D. Moraru and M. Tabe: “Single dopant transistor – Toward room temperature operation”, **ITRS ERM (International Technology Roadmap for Semiconductors Emerging Research Materials) Workshop** (Berkeley, USA), Jan. 2013.

15. (invited talk) M. Tabe and D. Moraru: “Single dopant devices: single-electron transport through single dopants”, **2nd ITRS ERM Deterministic Doping Workshop** (Univ. Berkley, USA), Nov. 2011.

AWARDS FROM SCIENTIFIC SOCIETIES

- **Japan Society of Applied Physics – Silicon Technology Division Paper Award** (第 11 回応用物理学会シリコンテクノロジー分科会「論文賞」受賞), Sophia University, 2020.
(for the paper: H. Firdaus, T. Watanabe, M. Hori, D. Moraru, Y. Takahashi, A. Fujiwara, and Y. Ono, *Electron aspirator using electron-electron scattering in nanoscale silicon*, **Nature Communications**, vol. 9, pp. 4813-1-8 (2018)).
- **Takayanagi Kenjiro Research Encouragement Award**, Nov. 2017.
(for: Research on high-temperature single-electron tunneling via dopants in silicon nanodevices).
- **Japan Society of Applied Physics – Silicon Technology Division Paper Award** (第 5 回応用物理学会シリコンテクノロジー分科会「論文賞」受賞), Sagamihara, 2014.
(for the paper: E. Hamid, D. Moraru, Y. Kuzuya, T. Mizuno, L. T. Anh, H. Mizuta, and M. Tabe, *Electron-tunneling operation of single-donor-atom transistors at elevated temperatures*, **Physical Review B**, vol. 87, no. 8, pp. 085420 (2013)).
- **IUMRS-ICEM 2012 Young Scientist Gold Award**, International Union of Materials Research Societies – International Conference on Electronic Materials (IUMRS-ICEM), Yokohama, 2012.
(D. Moraru, E. Hamid, Y. Kuzuya, T. Mizuno, H. Mizuta, and M. Tabe: “*Experimental and ab initio study of donor state deepening in SOI-MOSFETs*”).
- **2007 JSAP Young Scientist Award** for the Presentation of an Excellent Paper, Fall Meeting of Japan Society of Applied Physics, Kyoto, 2006.
(D. Moraru, Y. Ono, H. Inokawa, K. Yokoi, R. Nuryadi, H. Ikeda, and M. Tabe: “Single-electron transfer through multiple tunnel junctions in phosphorous-doped Si nanowires”).
- **SSDM 2006 Young Researcher Award**, International Conference on Solid State Devices and Materials, Yokohama, 2006.
(D. Moraru, H. Kato, S. Horiguchi, Y. Ishikawa, H. Ikeda, and M. Tabe: “Fowler-Nordheim current oscillations in Si(111)/SiO₂/twisted-Si(111) tunneling structures”).

PROFESSIONAL LINKS

Lab webpage: <https://www.shizuoka.ac.jp/morarulab/>
LinkedIn: <https://www.linkedin.com/in/danielmoraru/>
ORCID: <https://orcid.org/0000-0003-3836-3686>
ResearchGate: <https://www.researchgate.net/profile/Daniel-Moraru>
Google Scholar: <https://scholar.google.com/citations?hl=en&user=wIHmb7IAAAAJ>