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Engineering & Scientific Consulting

Tristan Truttmann, Ph.D., P.E.

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Professional Profile

Dr. Truttmann's general expertise lies in materials science, chemistry, and solid-state physics applied to the fundamental properties, production, and characterization of thin films and coatings. He has substantial experience in various characterization techniques including high-resolution X-ray diffraction (XRD), atomic force microscopy (AFM), X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM), focused ion beam (FIB), transmission electron microscopy (TEM), and Hall measurements. Dr. Truttmann often combines these experimental techniques with his in-depth knowledge of computer vision and inferential statistics to help clients address critical questions in failure analysis and intellectual property litigation across a diverse range of technologies, including batteries, solar cells, and consumer electronics.

Dr. Truttmann received his Ph.D. from the University of Minnesota in 2023. His research focused on the growth of wide-band-gap semiconductors with molecular beam epitaxy (MBE). His dissertation scrutinized how deposition techniques and growth conditions can be tailored to a specific material and application of interest. His dissertation work made substantial contributions to doping novel semiconductors with complex stoichiometries and to improving their functional properties.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, University of Minnesota, 2023

B.A., Chemistry, Macalester College, 2017

University of Minnesota Doctoral Dissertation Fellowship, 2021-2022

Licenses and Certifications

Professional Engineer Metallurgical, California, #2057

Professional Affiliations

Member of the Phi Beta Kappa Honor Society

Languages

Mandarin Chinese

Publications

T Truttmann, J Zhou, I Lu, A Rajapitamahuni, F Liu, T Mates, M Bernardi, B Jalan “Combined Experimental-Theoretical Study of Electron Mobility-Limiting Mechanisms in SrSnO₃” *Commun. Phys.* (2021) doi.org/10.1038/s42005-021-00742-w

T Truttmann, F Liu, J Barriocanal, R James, B Jalan “Strain Relaxation via Phase Transformation in SrSnO₃” *ACS Appl. Electron. Mater.* (2021) doi.org/10.1021/acsaelm.0c00997

T Truttmann, A Prakash, J Yue, T Mates, B Jalan “Dopant Solubility, and Charge Compensation in La-Doped SrSnO₃ films” *Appl. Phys. Lett.* (2019) doi.org/10.1063/1.5119272

H Yoon, T Truttmann, F Liu, B Matthews, S Choo, Q Su, V Saraswat, S Manzo, M Arnold, M Bowden, J Kawasaki, S Koester, S Spurgeon, S Chambers, B Jalan “Free-Standing Epitaxial SrTiO₃ Nanomembranes via Remote Epitaxy using Hybrid Molecular Beam Epitaxy” *Science Advances* (2022) (Equally Contributing Author) doi.org/10.1126/sciadv.add5328

F Liu, T Truttmann, D Lee, B Matthews, I Laraib, A Janotti, S Spurgeon, S Chambers, B Jalan “Hybrid Molecular Beam Epitaxy of germanium-based Oxides” *Communications Materials* (2021) (Equally Contributing Author) doi.org/10.1038/s43246-022-00290-y

F Liu, P Golani, T Truttmann, I Evangelista, M Smeaton, D Bugallo, J Wen, A Manjeshwar, S May, L Kourkoutis, A Janotti, S Koester, B Jalan “Doping the Undopable: Hybrid Molecular Beam Epitaxy Growth, n-Type Doping, and Field-Effect Transistor Using CaSnO₃” *ACS Nano* (2023) doi.org/10.1021/acsnano.3c04003

S Chambers, D Lee, Z Yang, Y Huang, W Samarakoon, H Zhou, P Sushko, T Truttmann, L Wangoh, T Lee, J Gabel, B Jalan, “Combining In-Situ and Ex-Situ Measurements to Probe Electronic Dead Layers in Homoepitaxial n-SrTiO₃(001) Films” *APL Materials* (2022) doi.org/10.1063/5.0098500

P Golani, C Saha, P Sundaram, F Liu, T Truttmann, V Chaganti, B Jalan, U Singiseti, S Koester, “Self-Heating in Ultra-Wide Bandgap n-Type SrSnO₃ Thin Films” *Appl. Phys. Lett.* (2022) doi.org/10.1063/5.010596

J Yue, Y Ayino, T Truttmann, M Gastiasoro, E Persky, A Khanukov, D Lee, L Thoutam, B Kalisky, R Fernandes, V Pribiag, B Jalan “Anomalous Transport in High-Mobility Superconducting SrTiO₃ Thin Films” *Sci. Adv.* (2022) doi.org/10.1126/sciadv.abl5668

D Lee, F Liu, T Truttmann, S Chambers, B Jalan, “Stoichiometry-Dependent Surface Electronic Structure of SrTiO₃ Films Grown by Hybrid Molecular Beam Epitaxy” *Appl. Phys. Lett.* (2022) doi.org/10.1063/5.0105962

L Thoutam, T Truttmann, A Rajapitamahuni, B Jalan “Hysteretic Magnetoresistance in a Non-Magnetic SrSnO₃ Film via Thermal Coupling to Dynamic Substrate Behavior” *Nano Lett.* (2021) doi.org/10.1021/acs.nanolett.1c03653

W Nunn, T Truttmann, B Jalan “A Review of Molecular Beam Epitaxy of Wide Bandgap Complex Oxide Semiconductors” *J. Mater. Res.* (2021) (Invited Review Article) doi.org/10.1557/s43578-021-00377-1

W Nunn, J Yue, A Manjeshwar, A Rajapitamahuni, T. Truttmann, B Jalan “Novel Synthesis Approach for Stubborn Metals and Metal Oxides”, *Proc. Natl. Acad. Sciences* (2021) doi.org/10.1073/pnas.2105713118

V Chaganti, T. Truttmann, F Liu, B Jalan, S Koester “Optimizing Ohmic Contacts to Nd-doped n-type SrSnO₃” *Phys. Lett.* (2021) doi.org/10.1063/5.0027470

J Wen, S K Chaganti, T Truttmann, F Liu, B Jalan, S Koester “SrSnO₃ Metal-Semiconductor Field-Effect

Transistor With GHz Operation" IEEE Electron Device Lett. (2021) doi.org/10.1109/LED.2020.3040417

A Prakash, T Wang, A Bucsek, T Truttmann, A Fali, M Cotrufo, H Yun, J Kim, P Ryan, A Mkhoyan, A Alu, Y Abate, R James, B Jalan "Self-Assembled Periodic Nanostructures Using Martensitic Phase Transformations" Nano Lett. (2020) doi.org/10.1021/acs.nanolett.0c03708

S K Chaganti, T Truttmann, F Liu, B Jalan, S Koester, "SrSnO₃ Field-Effect Transistors with Recessed Gate Electrodes" Electron Device Lett. (2020) doi.org/10.1109/LED.2020.3011058

S Provence, S Thapa, R Paudel, T Truttmann, A Prakash, B Jalan, R Comes, "Machine Learning Analysis of Perovskite Oxides Grown by Molecular Beam Epitaxy" Phys. Rev. Mater. (2020) doi.org/10.1103/PhysRevMaterials.4.083807

A Prakash, N Quackenbush, H Yun, J Held, T Wang, T Truttmann, J Ablett, C Weiland, T-L Lee, J Woicik, A Mkhoyan, B Jalan "Separating Electrons and Donors in BaSnO₃ via Band Engineering" Nano Lett. (2019) doi.org/10.1021/acs.nanolett.9b03825

T Wang, A Prakash, Y Dong, T Truttmann, A Bucsek, R James, D Fong, J-W Kim, P Ryan, H Zhou, T Birol, B Jalan "Engineering SrSnO₃ Phases and Electron Mobility at Room Temperature using Epitaxial Strain" ACS Appl. Mater. & Interfaces (2018) doi.org/10.1021/acsami.8b16592

S Kyasa, R Meier, R Pardini, T Truttmann, K Kuwata, P Dussault "Synthesis of Ethers via Reaction of Carbanions and Monoperoxyacetals" J. Org. Chem. (2015) doi.org/10.1021/acs.joc.5b02043

Presentations

T Truttmann, J Zhou, I Lu, A Rajapitamahuni, F Liu, R James, M Bernardi, B Jalan, "Hybrid Molecular Beam Epitaxy and Electronic Transport of Alkaline Earth Stannates" APS March Meeting (Chicago, 2022)

T Truttmann, J Zhou, I Lu, A Rajapitamahuni, F Liu, R James, M Bernardi, B Jalan "MBE Growth, Defect and Electronic Transport in Alkaline Earth Stannates" Invited Talk at Electronic Materials and Applications (Orlando, 2022)

T Truttmann, J Zhou, I Lu, A Rajapitamahuni, F Liu, R James, M Bernardi, B Jalan "Perovskite oxide as ultra-wide bandgap materials for transparent electronics" IPRIME Summer Meeting (Minneapolis, 2021)

T Truttmann, J Zhou, I Lu, A K Rajapitamahuni, F Liu, R James, M Bernardi, B Jalan "Strontium Stannate as an Ultra-Wide Bandgap Semiconductor" APS March Meeting (Boston, 2021)

T Truttmann, J Yue, L Thoutam, A Prakash, T Wang, F Liu, A Bucsek, Y Dong, T Mates, D Fong, J-W Kim, P Ryan, H Zhou, T Birol, R James, B Jalan "MBE Growth and Doping of Ultra-Wide Gap Perovskite SrSnO₃" MRS Fall Meeting (Boston, 2020)

T Truttmann, F Liu, A Prakash, J Yue, T Mates, B Jalan "Ultra-Wide Bandgap, Transparent Perovskite Oxides for Power Electronics" IPRIME Summer Meeting (Minneapolis, 2020)

T Truttmann, F Liu, A Prakash, J Yue, T Mates, B Jalan "Radical-Based MBE Growth, Chemical Doping, and Electronic Transport in SrSnO₃ films" APS March Meeting (Denver, 2020)

T Truttmann, T Wang, A Prakash, J Yue, Y Dong, A Bucsek, T Mates, R James, D Fong, J Kim, P Ryan, H Zhou, T Birol, B Jalan "Structure, Dopant Solubility, and Transport in La- doped Tetragonal SrSnO₃ Stabilized with Strain" American Vacuum Society Summer Meeting (St. Paul, 2019)

T Truttmann, T Wang, A Prakash, J Yue, H Yun, T Birol, A Mkhoyan, B Jalan "MBE Growth, Defects, & Doping in Strained SrSnO₃" International Conference for Defects in Semiconductors (Seattle, 2019)

T Truttmann, T Wang, A Prakash, J Yue, Y Dong, A Bucsek, T Mates, R James, D Fong, J Kim, P Ryan, H Zhou, T Birol, B Jalan “Structure, Dopant Solubility, and Transport in La-Doped Tetragonal SrSnO₃ Stabilized with Strain” IPrime Summer Meeting (Minneapolis, 2020)

T Truttmann, G Subramanian “Ab Initio Monte Carlo simulations of Military Contaminants Binding to Cellulose and its Derivatives” ACS Spring National Meeting (San Francisco, 2017)

T Truttmann, K Kuwata “Quantum Chemical Studies of a New Pathway to Ethers” MU3C Summer Conference (Chicago, 2015)