

Tonio Buonassisi

Professor, Mechanical Engineering, Massachusetts Institute of Technology

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[Google Scholar](#) | [Buonassisi Group](#) | [LinkedIn](#)

Professional Experience

Professor, Mechanical Engineering

Massachusetts Institute of Technology, Cambridge, MA | 2007-Present

- Progression: Full Professor (2019–present), Associate Professor (2012–2019), Assistant Professor (2007–2012)
- Director, Center for Accelerated Co-Design of Durable, Reproducible, and Efficient Perovskite Tandems (ADDEPT) | 2023–present
- Associate Director, Outreach, Singapore-MIT Alliance for Research & Technology (SMART) | 2019–2021

Founding Director

Accelerated Materials Development Program, A*STAR, Singapore | 2018–2019

Co-Founder

Fraunhofer Center for Sustainable Energy Systems (FhCSE), Boston | 2007

Crystal Growth Scientist

Evergreen Solar Inc., Marlborough, MA | 2005-2007

Graduate Student Researcher & Visiting Researcher

University of California, Berkeley | 2001–2006

Research Impact

- Pioneered open-science machine-learning frameworks accelerating materials optimization and discovery across sectors | 2014–Present
- Developed solar-based storage, desalination, and IoT technologies, adapting them to run on intermittent, non-dispatchable renewable power | 2018–present
- Co-invented silicon-perovskite tandem solar cells, in collaboration with Stanford's McGehee team | 2015
- Collaborated to create record-efficiency perovskite solar cells and tandems, reflected on the NREL record efficiency chart | 2017–2019
- Formulated computation tools with NREL and CSM, identifying novel Earth-abundant solar materials with defect tolerance | 2015–2017

- Co-created an open-source, satellite-based method for predicting the energy yield of silicon and other novel solar cell materials, influencing the industry-standard tool (PVSyst) | 2017–2020
- In a key industry collaboration, unraveled the properties of defects causing LeTID in *p*-type PERC multicrystalline silicon solar cells and championed the development of mitigation strategies | 2016–2017
- Galvanized the academic community to establish best practices for characterizing new photovoltaic materials, resulting in a widely-cited workshop proceeding | 2016–2017
- Collaborated with Harvard researchers to design a Si-based solar-cell architecture that enables 10%-efficient solar water splitting at neutral pH, using equivalent-circuit model to predict performance limits | 2011–2013
- Joined forces with NREL to craft bottom-up cost models to evaluate innovation paths towards DOE SunShot targets, barriers to scale, and GHG intensity, influencing domestic manufacturing competitiveness | 2012–2020
- Championed defect-engineering technologies now utilized in the commercial silicon PV industry, and explored cost-effective wafer technologies like epi silicon | 2003–2017

Industry Engagement & National Service | 2007–Present

- Director of ADDEPT, a national center improving durability of perovskite-silicon tandems
- Successful tech transfers in collaboration projects with over a dozen industrial partners
- Developed solar technology roadmaps that helped shape industry and government R&D

Education Initiatives

- Co-created an "Applied Machine Learning" graduate course at MIT, integrating autonomous laboratory techniques | 2020
- Taught "Fundamentals of Photovoltaics" graduate and undergraduate course at Berkeley & MIT, mentoring over 200 students | 2004–2014
 - Launched online version of "Fundamentals of Photovoltaics" with over 353k unique visits on OpenCourseWare and 904k YouTube views | 2013
- Mentored over 50 Masters, Ph.D., postdocs, and research scientists advancing in independent careers across sectors

Awards & Recognitions

- Clarivate Highly Cited | 2022, 2023
- Presidential Early Career Award for Scientists and Engineers (PECASE) | 2016
- Everett Moore Baker Memorial Award for Excellence in Undergraduate Teaching, MIT | 2015
- Google Faculty Award | 2015
- NSF CAREER Award | 2012