

GIOVANNA BUCCI | CURRICULUM VITAE

- » **Fields:** Computational solid mechanics, Materials for energy storage and conversion, Fracture mechanics, Coarse-grained modeling of polymers, Data-driven methods, Parallel computing
- » **Applications:** Solid-state Li-ion batteries, Proton-exchange membrane fuel cells, DNA sequencing

»»» Experience

2017 - now **Senior Research Engineer** Bosch (Sunnyvale, CA)

- » Model energy storage devices and advanced algorithms for battery management systems
- » Analyze material and cell-design requirements for enabling high energy-density solid-state batteries with Li-metal anodes
- » Predict catalyst degradation for PEM fuel cell cathodes via mesoscale modeling
- » Model of pH modulation and DNA sequencing devices in collaboration with Bosch biosensors department, MIT and Stanford

2017 - now **Research Affiliate** MIT · Materials Science

- » Develop phase-field models to study Oswald ripening of Pt-catalysts for PEM fuel cells
- » Advise undergraduate and graduate students on fundamental studies of Li electro-deposition on ceramic electrolytes

2014 - 2017 **Postdoctoral Associate** MIT · Materials Science

- » Advisors: W. Craig Carter and Yet-Ming Chiang
- » Developed high fidelity multi-physics models of solid state batteries to analyze in-situ behavior
- » Implemented a finite element code in C++ for mesoscale modeling of electrode's microstructures. Identified failure-tolerant materials and designs

2012 - 2013 **Postdoctoral Research Assistant** Brown University

- » Advisors: A. Bower and P. Guduru
- » Modeled electrochemical and mechanical performances of silicon anodes
- » Predicted stress-driven hysteresis, plastic flow and fracture in Si anodes

2008 - 2009 **Graduate Research Assistant** Università di Pavia (Italy)

- » Designed sustainable concrete with rice husk ash to partially replace the binder
- » Tested mechanical properties of specimens with various compositions
- » Collaboration with local biomass-energy company

»»» Education

2012 **PhD in Structural Mechanics** Politecnico di Milano (Italy)

- » Thesis: Finite element modeling of fracture in brittle materials driven by thermal loading
- » Solid mechanics, Fracture, Programming, Parallel computing

2010 - 2011 **Roberto Rocca Doctoral Fellow** MIT · AeroAstro Dept

- » Selected as top Politecnico PhD for a research stay at MIT (advisor: Roul Radovitzky)

2007 **M.S. in Building Engineering/Architecture** Università di Pavia (Italy)

- » Thesis: Project for a guesthouse and a school for the General Hospital of Ayamé (Côte d'Ivoire). Testing of a sustainable material: concrete with partial replacement of the binder with rice husk ash

»» Awards

2019	Bosch Research Fellowship	Stanford - Materials Science Dept.
	» Recognizing the most innovative research proposal with 6-months sabbatical at Stanford University focused on DNA modeling	
2015	Rising Stars in Nuclear Science and Engineering	MIT - Nuclear Science Dept.
	» Biannual symposium that promotes women on the verge of launching their careers	
2010 - 2011	Roberto Rocca Doctoral Fellow	MIT · AeroAstro Dept
	» Selected as top Politecnico PhD for a research stay at MIT	
2015	XSEDE Startup Allocation	NSF
	» Computational resources awarded as PI of the project on solid-state battery modeling	

»» Publications · refereed journal articles

2020	G. Bucci , W. C. Carter · Mesoscale model for Ostwald ripening of catalyst nano-particles · J. Electrochem. Soc. (submitted)
2020	G. Bucci et al. · Free energy landscape for defect annihilation in nano-confined DNA · (in preparation)
2020	G. Bucci , A. J. Spakowitz · Systematic Approach toward Accurate and Efficient DNA Sequencing via Nanoconfinement · Macro Letters 9(8):1184-1191
2019	G. Bucci , J. Christensen · Modeling of lithium electrodeposition at the lithium/ceramic electrolyte interface: The role of interfacial resistance and surface defects · J. Pow. Sources 441:227186
2018	<i>Maternity leave</i>
2018	G. Bucci , B. Talamini, A. Renuka Balakrishna, Y.-M. Chiang, W.C. Carter · Mechanical instability of electrode/electrolyte interfaces in solid-state batteries · Phys. Rev. Materials 2(10): 105407
2017	G. Bucci , T. Swamy, Y.-M. Chiang, W.C. Carter · Modeling of internal mechanical failure of all-solid-state batteries during electrochemical cycling, and implications for battery design · J. Materials Chemistry A 5(36)
2017	G. Bucci , T. Swamy, Y.-M. Chiang, W.C. Carter · Random walk analysis of the effect of mechanical degradation on all-solid-state battery power · J. Electrochem. Soc. 164(12):A2660-A2664
2017	G. Bucci , T. Swamy, S. Bishop, B. Sheldon, Y.-M. Chiang, W.C. Carter · The effect of stress on battery-electrode capacity · J. Electrochem. Soc. 164(4):A645-A654
2016	G. Bucci Y.-M. Chiang, W.C. Carter · Formulation of the coupled electrochemical-mechanical boundary-value problem, with applications to transport of multiple charged species · Acta Mater. 62:33-51
2015	<i>Maternity leave</i>
2014	G. Bucci , S. P. V. Nadimpalli, V. A. Sethuraman, A. F. Bower, and P. R. Guduru · Measurement and modeling of the mechanical and electrochemical response of amorphous Si thin film electrodes during cyclic lithiation · J. of Mechan. Phys. Sol. 62:276-294
2013	S.P.V. Nadimpalli, V.A. Sethuraman, G. Bucci , V. Srinivasan, A.F. Bower, and P.R. Guduru · On plastic deformation and fracture in Si films during electrochemical lithiation cycling · J. Electrochem. Soc. 60:A1885-A1893

»»» Publications · books

- 2019 **G. Bucci** and W.C. Carter · Handbook of Mechanics of Materials. Micro-mechanics in electrochemical systems · Springer Singapore, 901–953
- 2010 **G. Bucci** and C. Cinquini · Elementi di Teoria della Trave e Soluzioni Strutturali · Schonenfeld & Ziegler

»»» Patents

- 2017 K. Gadelrab, **G. Bucci**, N.-P. Craig, C. Johnson, N. Fomina and Y.-S. Shin · Nanoscale topography for DNA sequencing using directed self-assembly of block copolymers · U.S. Serial No. 16/721,318 · filed Dec 19, 2019
- 2017 N.-P. Craig and **G. Bucci** · Composite reinforced solid electrolyte to prevent protrusions · U.S. Serial No. 62/547,155 · filed August 18, 2017

»»» Teaching Experience

- 2016 - 2017 **Content Developer** MIT - Materials Science Dept.
» Computational Methods for Materials Scientists and Engineers class
- 2006 - 2010 **Teaching Assistant** Politecnico di Milano / Università di Pavia (Italy)
» Mechanics of Solids and Structures class

»»» Service Activities

- 2016 - **Mentorship** MIT - Materials Science Dept.
» Research advisor for several graduate and undergraduate students in the Carter/Chaing group
- 2016 - **Committee** MIT/Bosch
» Postdoc representative in the Council on Family and Work advocating for policies in support of maternity and childcare
» Advocacy committee member for Postdoctoral Association
» Women@Bosch board member

»»» Professional Activities

Reviewer

- » International Journal of Solids and Structures, Acta Materialia, Journal of Electrochemical Society, Journal of Power Sources, Electrochimica Acta, Macro Letters, Advanced Materials

Session Chair

- » Symposium on all-solid-state batteries at the Solid State Ionics conference (2017)
» New England Workshop on the Mechanics of Materials and Structures (2013)

Invited keynote talk

- » SES 57th Annual Technical Meeting (2020)
» ICACC Symposium on Rechargeable Energy Storage (2017)
» Rising Stars in Nuclear Science and Engineering Symposium (2015)
» SES 50th Annual Technical Meeting (2013)