
Taylor D. Sparks

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❖ Research Summary:

Synthesis of complex materials and investigation of their structure property relationships with applications in energy. Exploring how materials informatics can accelerate new materials discovery.

❖ Education:

2009-2012 PhD, Harvard University, Cambridge, MA. Applied Physics Department. Faculty Advisor: David Clarke. Dissertation entitled "*Oxide Thermoelectrics: Role of Crystal Structure on Thermopower in Strongly Correlated Spinels*," May 2012.

2007-2009 M.S. in Materials, University of California, Santa Barbara, CA. Materials Department. Faculty Advisor: David Clarke. Thesis entitled "*Thermal Conductivity and Anisotropy of Layered Oxides*," September 2010.

2004-2007 B.S. (*honors*) in Materials Science & Engineering, University of Utah, Salt Lake City, UT. Materials Science & Engineering Department. Minor in Chemistry. Senior Thesis Adviser: Raymond Cutler. Thesis entitled "*Reaction-bonded CERCANAM® Material for High-Strength Low-Cost Refractories*," June 2007.

❖ Employment:

2019 – present Associate Chair, Materials Science and Engineering, University of Utah, Salt Lake City, UT

2019 – present Associate Professor, Materials Science and Engineering, University of Utah, Salt Lake City, UT

2013-2019 Director of the Materials Characterization Laboratory, University of Utah, Salt Lake City, UT

2013 – 2019 Assistant Professor, Materials Science and Engineering, University of Utah, Salt Lake City, UT

2012-2013 Postdoctoral Fellow, UC Santa Barbara. Working with Ram Seshadri on thermoelectrics, biphasic materials, and magnetodielectrics materials.

Fall 2011 International Center for Materials Research Fellow (ICMR). Institut Laue-Langevin, Grenoble, France and Technische Universität Darmstadt, Darmstadt, Germany.

Summer 2010 International Research and Education in Engineering (NSF-IREE) 2010 China Program awardee, Shanghai Institute of Ceramics Chinese Academy of Science (SICCAS), Shanghai China. Working under Gu Hui research focused on developing thermoelectric oxides.

Summer 2008 & 2009 International summer research, Tsinghua University, Beijing China. Working under Pan Wei research focused on identifying low thermal conductivity oxides.

2004-2007 Ceramatec Inc., Salt Lake City, UT. Research Intern at working under Principal Investigator Akash Akash. Research focused on improving the strength of reaction-bonded ceramic refractories.

❖ **Publications: Over 6 patents and 65 articles as of November 2020. See complete list [here](#).**

❖ Federal Government Research Contracts:

1. "Designing Novel Multicomponent Niobium Alloys for High Temperature: Integrated Design, Rapid Processing & Validation Approach." DOE arpa-e, Phase I ULTIMATE program, Co-PI, (06/01/2021-12/31/2022)

2. "Quantum Computer Topological Insulator Single Crystal Material" KFAS, PI, (01/01/2021-12/31/2022).
3. "Research Experience in Utah for Sustainable Materials Engineering (ReUSE)" NSF DMR, PI (07/01/2020-06/30/2023).
4. "QII-TAQS: Quantum Devices with Majorana Fermions in High-Quality Three-Dimensional Topological Insulator Heterostructures" NSF MPS, Co-PI, (09/01/2019-08/30/2022).
5. "Collaborative Research: SSMCDAT2020: Solid-State and Materials Chemistry Data Science Hackathon" NSF DMR, PI, (07/01/2019-06/30/2020).
6. "Early Demonstration of Combinatorial Alloy Fabrication and FAST Irradiation Testing" INL Out-of-cycle LDRD, Co-PI (04/03/2019-09/30/2019).
7. "Accelerated Nuclear Materials and Fuel Qualification by Adopting a First to Failure Approach", INL LDRD, Co-PI, (10/01/2018-09/30/2021).
8. "Fluorhydroxyapatite Coatings for Facilitating Epithelial Cells Adhesion to the Implant Surface for Preventing Infection in Percutaneous Implant Systems" DOD CDMRP PRORP (W81XWH-15-1-0682), Co-PI, (07/01/2014-06/30/2019).
9. "CAREER: SusChEM: Data Mining to Reduce the Risk in Discovering New Sustainable Thermoelectric Materials" NSF SSMC, PI, (07/01/2017 – 06/30/2022).
10. "Collaborative Research: Guided discovery of sustainable superhard materials via bond optimization" NSF CMMI MEP, PI, (06/01/2016-05/31/2019).
11. "Data-driven discovery of novel thermoelectric materials," DARPA SIMPLEX, Department of Defense, Defense Sciences Office, Co-PI (04/01/2015-06/31/2018).
12. "Ceramic proppant design for in-situ microbially enhanced methane recovery," National Energy Technology Laboratory, Department of Energy, Office of Fossil Fuels, PI with Co-PI J. McLennan, (10/1/2014-9/30/2016).

❖ **Non-Federal Government Research Contracts:**

1. "Metallization of Metamaterial Latticed Polymer Waveguide Structures." L3Harris, PI, (09/01/2020-08/31/2020)
2. "Biodegradable hot wax-sealable packaging materials" Procter & Gamble, PI, (01/01/2020-06/30/2020).
3. "An investigation of pathogens on rock climbing mat materials" IU4U, University of Utah, Co-PI (02/01/2020-06/30/2021)
4. "Characterization and comparison of fluoropolymer composites for waste water treatment" Fisher Company, PI, (09/15/2017-09/14/2018).
5. "Flexible and laminable adjustable tint films" USTAR IPP, PI, (09/01/2016 – 08/30/2017).
6. "Mechanical properties of fluoropolymer composites for chemical liners," Fisher Company, PI, (03/01/2015-05/31/2015).
7. "Optimized power harvesting with tunable thermoelectric devices," Principle Energy Initiative Program, Utah Office of Energy Development, PI, (09/01/2015 – 08/31/2016).
8. "Scalable deposition method of electrochromic coatings for energy efficient windows" Governor's Energy Research Scholars Program, Utah Energy Research Triangle, State of Utah, PI with Co-PI J. Copeland, (07/01/2015-06/30/2016).
9. "Characterization of Inconel 718+ Alloy for Honeywell International," Honeywell International Inc., PI, (04/05/2016-09/15/2016).
10. "Characterization of SiC and Si₃N₄ for Honeywell International," Honeywell International Inc., Co-PI, (07/01/2015-10/15/2016).
11. "Characterization and comparison of fluoropolymer composites for chemical liners," Fisher Company, PI, (03/01/2015-05/31/2015).
12. "Layered topological insulators in the 2D limit," MRSEC Seed Grant Award, with V. Deshpande (01/01/2015-12/31/2015).
13. "Characterization of steel blanks used for copper refining," Rio Tinto Group, Kennecott Copper LLC, PI, (01/15/2015-03/15/2015).
14. "Evaluation of cold temperature performance of PCM based thermal management systems in hybrid electric vehicles," University of Utah Seed Grant Award, PI, (07/01/2014-06/30/2015).

15. "High-performance Mg₂Si nanostructured thermoelectric materials," Governor's Energy Research Scholars Program, Utah Energy Research Triangle, State of Utah, PI with Co-PI M. Judge, (07/01/2014-06/30/2015).
16. "Evaluation of cold temperature performance of PCM based TMS in hybrid electric vehicles," Governor's Energy Research Scholars Program, Utah Energy Research Triangle, State of Utah, PI with Co-PI L. Ghadbeigi, (07/01/2014-06/30/2015).

❖ Foreign Language:

Fluent in Spanish (lived in Argentina for two years for LDS mission), conversant and literate in German, intermediate Mandarin Chinese (lived in China for 7 months).

❖ Honors and Awards:

2019 TEDxSaltLakeCity invited speaker
2019 Journal of Materials Chemistry A "2019 Emerging Investigators"
2018 Turning Technologies Distinguished Educator
2018 Journal of Materials Research "2018 Early Career Scholars In Materials Science"
2016-present LDSSA and Salt Lake University Institute Excellence in Education Recognition Award.
2016 NSF CAREER Award
2016 Runners up in Challenge.gov AFRL Materials Science and Engineering Data Challenge
2016 Career Services Faculty Recognition Award, University of Utah.
2012 Best Poster Award 2012 MRS Fall Meeting (coauthored poster).
2010 recipient of the 2010 Ron Jenkins Tuition Waiver award from the International Centre for Diffraction Data, Rietveld Refinement and Indexing Workshop.
2010 NSF-IREE (International Research and Education in Engineering) 2010 China Program award recipient.
2009 First Place Poster, ICMR Spring School on Thermal Conductivity and Related Transport Properties of Oxides. Gainesville FL, May 17-23 2009.
2007 Second Place Poster, University of Utah, Materials Department Senior Posters
2007 "Outstanding Graduating Senior for 2007" for the Department of Materials Science and Engineering, University of Utah

❖ Volunteering and Service:

2019-present Editorial Board Member for *Scientific Reports*
2019-present Section Editor over Materials Informatics for *Data in Brief*
2018 TMS Materials Data Task Force Member
2018 ACerS Meetings Committee Member
2017-present Scientific Advisory Board Member for Citrine Informatics
2017-present Editorial Board Member for *Integrating Materials and Manufacturing Innovation*
2015-2018 Scoutmaster for East Millcreek 7th Ward Troop, Boy Scouts of America
2012-present Reviewer for *Journal of Materials Chemistry A, Nature, Progress in Energy and Combustion Science, Chemistry of Materials, Acta Materialia, Journal of the American Chemical Society, Journal of the American Ceramic Society, Nano Energy, Journal of Materials Chemistry C, Journal of Applied Physics, Applied Physics Letters, ACS Applied Materials & Interfaces, Journal of Alloys and Compounds, Nanoscale, Physica Status Solidi (a), APL Materials, Metallurgical and Materials Transactions A, Journal of Physics and Chemistry of Solids, Journal of Industrial and Engineering Chemistry, Journal of Electronic Materials, Renewable and Sustainable Energy Reviews, and Advanced Energy Materials*
2007-2009 Assistant Scoutmaster for Goleta Valley Troop, Boy Scouts of America
2002-2004 Served a two year, full-time proselyting mission for the Church of Jesus Christ of Latter-Day Saints in Bahia Blanca, Argentina

❖ Mentoring

PhD Students: (starting year): Leila Ghadbeigi (2013, co-advised with Prof. Virkar), Alexander Szendrei (2014, co-advised with Prof. Virkar), Jake Graser (2014), Marcus Parry (2016), Ka'ai Kauwe (2017), Chong Lei (2017, co-advised with Prof. Virkar), Jason Hall (2018), Husain Alnaser (2019), Hasan Sayeed (2020), and Sterling Baird (2020).

MS Students: (graduating year): Colton Fox (2018), Christian Robert (2018), Logan Kiefer (2019), Ashley Kennedy (2019), Dani Beatty (2020), Clarke Nielson (2020), Jason Nance (2020), Amber Barron (2020), Hayden Johnson (2021), Isaac Krieger (2022).

Postdoctoral Researchers: Jeff Bates (2013-2014), Wu Wenjuan (2016-2017, CSC recipient), Kyu Bum Han (2014-2017), Shadi Al Khateeb (2016-2018), Maged Bekheet (2018)

Undergraduate Student Researchers: 85 since 2013 with 51% of publications include undergrad coauthors.