York R. Smith

UNIVERSITY OF UTAH
DEPARTMENT OF MATERIALS SCIENCE & ENGINEERING
YORK.SMITH@UTAH

Education

Ph.D.	Metallurgical Engineering University of Utah	2014 Salt Lake City, UT
M.S.	Chemical Engineering University of Nevada, Reno	2011 Reno, NV
B.S.	Chemical Engineering, Process Control University of Nevada, Reno	2010 Reno, NV

Professional Experience- Academic

Assistant Professor — July 2016-present
Materials Science and Engineering Department
University of Utah
Salt Lake City, UT

U.S. DOE EERE SunShot — Sept 2015-June 2016
Postdoctoral Research Associate
Metallurgical Engineering Department
University of Utah
Salt Lake City, UT

Postdoctoral Research Associate — May 2014-Sept 2015
Metallurgical Engineering Department
University of Utah
Salt Lake City, UT

Graduate Research Fellow — Aug 2013-May 2014
University of Utah
Salt Lake City, UT

Graduate Research Assistant — Aug 2012-July 2013
University of Utah
Salt Lake City, UT

Research Associate — July 2011-July 2012
Director, Nanomaterials Characterization Facility
Metallurgical Engineering Department
University of Utah
Salt Lake City, UT

Research Assistant — Jan 2010-May 2011
Chemical & Materials Engineering Department
University of Nevada, Reno
Reno, NV

Project Associate — July 2009-Dec 2009
National Centre for Catalysis Research
Indian Institute of Technology, Madras
Chennai, Tamilnadu, India

Professional Experience- Non-Academic

Chief Process Engineer — Jan 2016-Oct 2017
pCO Technologies, LLC
Salt Lake City, UT

R&D Engineer — Oct 2013-Sept 2015
Nanosynth Sensors & Materials
Salt Lake City, UT

Alpine Ski Coach — Dec 2007-Apr 2011
Diamond Peak Ski Education Foundation
Incline Village, NV

Engineer Intern — May 2006-Aug 2006
Paiute Pipeline Company
Carson City, NV

Foreman — June 1998-Aug 2005
C.H. Smith Company, Inc.
Charlevoix, MI

Funding, Grants & Contracts

As Principal Investigator

1. Geothermal Energy DLE Prize
    - Amount: $40,000
    - Status: Prize money, 2021
    - Title: Engineered Lithium-Ion Sieve Technology (E-LIST) for Direct Lithium Extraction and Lithium Hydroxide Production
    - Co-PIs: Michael McKibben, UC Riverside; Greeshma Gadikota, Cornell University; John McLennan, University of Utah
2. U.S. Department of Energy, The REMADE Institute
    - Amount: $985,106
    - Status: Funded, 2021-2023

- Title: Efficient Purification and Reuse of Carbon Black Recovered from End-of-Life Tires
- Industry Collaborator: Green Carbon
- Co-PI: Jeffery Bates, University of Utah
- Key Personnel: Robert Fox, Idaho National Laboratory

3. University of Utah, CMES-VPR Seed Grant
    - Amount: $27,500
    - Status: Funded, 2021-2022
    - Title: A Green Process for Recycling Lithium-Ion Batteries
    - Co-PI: H. Y. Sohn, University of Utah
4. U.S. Department of Energy, The REMADE Institute
    - Amount: $199,017
    - Status: *Completed*, 2019-2020
    - Title: Demineralization of Carbon Black Derived from of End-of-Life Tires
    - Industry Collaborator: OTR Wheel Engineering & Green Carbon
    - Co-PI: Robert Fox, Idaho National Laboratory
5. U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, SunShot Initiative
    - Amount: $105,104
    - Status: *Completed*, 2017-2019
    - Title: Electrodynamic Eddy Current Separation of End-of-Life Solar Panels

As Co-Principal Investigator/Key Personnel

1. U.S. Department of Energy, CORE-CM, PI: Michael Free, University of Utah
    - Project Amount: $1,500,000
        i. Co-PI
        ii. My contribution: $45,000
    - Title: Transforming Uinta Basin Earth Materials for Advanced Products
    - Status: Funded, 2021-2023
2. U.S. Department of Energy, Basic Energy Science, Energy Frontier Research Center, PI and Director: Darryl Butt, University of Utah
    - Project amount: $10,750,000
        i. Key Personnel
        ii. $50,000 provided by Darryl Butt
    - Title: Center for Multi-Scale Fluid-Solid Interaction in Architectured and Natural Materials (MUSE)
    - Status: Funded, 2018-2022

Peer-Reviewed Journal Publications

2,088 citations, h-index = 23, as of 29-Dec. 2021, Google Scholar Link

**As corresponding author*

1. Pinegar, H; Marthi, R.; Yang, P; **Smith, Y.R.***, Reductive Thermal Treatment of $LiCoO_2$ from the End-of-Life Lithium-Ion Batteries with Hydrogen, *ACS Sustainable Chemistry & Engineering*, **2021**, 9(22), 7447-7453.

2. Marthi, R; Asgar, H.; Gadikota, G.; **Smith, Y.R.***, On the Structure and Lithium Adsorption Mechanism of Layered H_2TiO_3, *ACS Applied Materials & Interfaces*, **2021**, 13(7), 8361-8369.

3. Marthi, R.; **Smith, Y.R.***, Application and limitations of a H_2TiO_3-Diatomaceous earth composite synthesized from titania slag as a selective lithium adsorbent, *Separation and Purification Technology*, **2021**, 254, 1175800.

4. Bogust, P.; **Smith, Y.R.***, Physical separation and beneficiation of end-of-life photovoltaic panel materials: utilizing temperature swings and particle shape, *JOM*, **2020**, 72(2), 2615-2623.

5. Pinegar, H.; **Smith, Y.R.***, Recycling of End-of-Life Lithium Ion Batteries, Part II: Laboratory Scale Research Developments in Mechanical, Thermal, and Leaching Treatments, *Journal of Sustainable Metallurgy*, **2020**, *6*, 142-160.

6. Pinegar, H.; **Smith, Y.R.***, End-of-Life Lithium-Ion Battery Component Mechanical Liberation and Separation, *JOM*, **2019**, 71(12), 4447-4456.

7. Pinegar, H.; **Smith, Y.R.***, Recycling of End-of-Life lithium ion batteries, Part I: Commercial Processes, *Journal of Sustainable Metallurgy*, **2019**, *4*, 1-15.

8. Srivastav, A.; Verma, Anuradha; khan, Saif; **Smith, Y.R.**; Satsangi, Vibha Rani; Shrivastav, Rohit; and Dass, S., Photoelectrochemical water splitting with 600 keV N2+ ion irradiated BiVO4 and BiVO4/Au photoanodes, *Int. J. Hydrogen Energy*, **2019**, 44(26), 13061-13070.

9. Marthi, R; **Smith, Y.R.*,** Selective recovery of lithium from the Great Salt Lake using lithium manganese oxide-diatomaceous earth composite, *Hydrometallurgy*, **2019**, 186, 115-125.

10. **Smith, Y.R.***; Nagel, J.R.; Rajamani, R.K. Eddy current separation for recovery of non-ferrous metallic particles: A comprehensive review, *Minerals Engineering*, **2019**, 133, 149-159.

11. Srivastav, A.; Kumar, P.; Verma, A.; **Smith, Y.R.;** Satsangi, V.R.; Shrivastav, R.; Waghmare, U.V.; and Dass, S., Experimental and first-principles studies of $BiVO_4/BiV_{1-x}Mn_xO_{4-y}$ n-n+ homojunction for efficient charge carrier separation in sunlight induced water splitting. *Int. J. Hydrogen Energy*, **2018**, 43(33), 15815-15822.

12. Bhattacharyya, D., Kumar, P., **Smith, Y.R.***, Mohanty, S.K. and Misra, M., Plasmonic-enhanced electrochemical detection of volatile biomarkers with gold functionalized TiO2 nanotube arrays. *Journal of Materials Science & Technology*, **2018** 34(6), 905-913.

13. **Smith, Y.R.***; Kumar, P.; McLennan, J.D., On the Extraction of Rare Earth Elements from Geothermal Brines, *Resources*, **2017**, *6*(3), 39-55. (*Invited Article*)

14. Bhattacharyya D.; Kumar P.; Mohanty S.K.; **Smith Y.R.**; Misra M., Detection of Four Distinct Volatile Indicators of Colorectal Cancer using Functionalized Titania Nanotubular Arrays, *Sensors*, **2017**, *17*(8), 1795-1810.

15. Kumar P.; Mohanty S.K.; Guruswamy S.; **Smith Y.R.;** Misra M., Detection of Food Decay Products using Functionalized One-Dimensional Titania Nanotubular Arrays, *IEEE Sensors Letters*, **2017**, *1*(4), 4500704.

16. **Smith, Y.R.***; Bhattacharyya, D.; Willhard, T.; Misra, M. Adsorption of Aqueous Rare Earth Elements using Carbon Black Derived From Recycled Tires, *Chem. Eng. J.*, **2016**, *269*, 102-111.

17. **Smith, Y.R.;** Bhattacharyya, D.; Mohanty, S.K.; Misra, M. Anodic Functionalization of Titania Nanotube Arrays for the Electrochemical Detection of Tuberculosis Biomarker Vapors, *J. Electrochem. Soc.*, **2016**, *163*, B1-B7.

18. Bhattacharyya, D.; **Smith, Y.R.**; Mohanty, S.K.; Misra, M. Titania Nanotube Array Biosensor for Electrochemical Detection of Four Predominate Tuberculosis Volatile Biomarkers, *J. Electrochem. Soc.* **2016**, *163*, B206-B214.

19. Jayamohan, H; **Smith, Y.R.**; Misra, M.; Mohanty, S.K.; Gale, B.K. Photocatalytic Microfluid Reactors Utilizing Titania Nanotubes on Titanium Mesh for Degradation of Organic and Biological Contaminates, *J. Environ. Chem. Eng.*, **2016**, *4*, 657-663.

20. **Smith, Y.R.***; Heermance, D.; Smith, R.N. Photo-Effects on The Viscosity of Titania Nanoparticle Suspensions in Conducting and Insulating Medium, *Korea-Aust. Rheol. J.*, **2016**, *28*, 51-54.

21. Gakhar, R.; **Smith, Y.R.**; Misra, M.; Chidambaram, D. Photoelectric performance of TiO_2 nanotube array photoelectrodes sensitized with $CdS_{0.54}Se_{0.46}$ quantum dots, *Appl. Sur. Sci.*, **2015**, *355*, 1279-1288.

22. Sarma, B.; Jurovitzki, A.; Ray, R.S.; **Smith, Y.R.**; Mohanty, S.K.; Misra, M. Electrochemical capacitance of iron oxide nanotube (Fe-NT): effect of annealing atmospheres, *Nanotechnology*, **2015**, *26*, 265401.

23. Saraswatt, P.K.; **Smith, Y.R.**; Free, M.L.; Misra, M. Duality in Resistance Switching Behavior of TiO_2-Cu_2ZnSnS_4 Device, *ECS J. Solid State Sci. Technol.*, **2015**, *4*(8), Q1-Q9.

24. Jayamohan, H; **Smith, Y.R.**; Gale, B.K.; Mohanty, S.K.; Misra, M. Titania Nanotube Array Based Microfluidic Device for Photocatalytic Applications: Experiment and Simulation, *Appl. Catal. B: Environ.*, **2015**, *174*, 167-175.

25. Bhattacharyya, D.; **Smith, Y.R.**; Misra, M.; Mohanty, S.K. Electrochemical detection of methyl nicotinate biomarker using functionalized titania nanotube arrays, *Mater. Res. Express*, **2015**, *2*, 025002.

26. Chappanda, K.N.; **Smith, Y.R.**; Mohanty, S.K.; Rieth, L.W.; Tathireddy, P.; Misra, M. Effect of Sputtering Parameters on the Morphology of TiO_2 nanotubes synthesized on Si substrate, *IEEE Trans. Nanotechnology*, **2014**, *14*, 18-25.

27. Sarma, B.; Jurovitzki, A.; **Smith, Y.R.**; Ray, R.S.; Mohanty, S.K.; Misra, M. Influence of Annealing Temperature on the Morphology and the Supercapacitance Behavior of Iron Oxide Nanotube (Fe-NT), *J. Power Sources*, **2014**, *272*, 766-775.

28. **Smith, Y.R.**; Gakhar, R.; Merwin, A.; Mohanty, S.K.; Chidambaram, D.; Misra, M. Anodic Titania Nanotube Arrays Sensitized with Mn- or Co-Doped CdS Nanocrystals, *Electrochim. Acta*, **2014**, *135*, 503-512.

29. Chappanda, K.N.; **Smith, Y.R.**; Rieth, L.W.; Tathireddy, P.; Misra, M.; Mohanty, S.K. TiO_2-WO_3 Composite nanotubes from co-sputtered thin films on Si substrate for enhanced photoelectrochemical water splitting, *J. Electrochem. Soc.*, **2014**, *161*, H1-H7.

30. **Smith, Y.R.** and Sohn, H.Y. Application of Additive-Reaction-Times Law to the Mixed-Control Kinetics of Oxygen Leaching of Chalcopyrite, *Hydrometallurgy*, **2014**, 146, 164-168.

31. **Smith, Y.R.**; Crone, E.; Subramanian, V. A Simple Photocell to Demonstrate Solar Energy Using Benign Household Ingredients, *J. Chem. Educ.*, **2013**, *90*, 1358-1361.

32. **Smith, Y.R.**; Ray, R.S.; Carlson, K.; Sarma, B.; Misra, M., Self-Ordered Titanium Dioxide Nanotube Arrays: Anodic Synthesis and Their Photo/electro-catalytic Applications, *Materials*, **2013**, *6*, 2892-2957.

33. Sarma, B.; **Smith, Y.R.**; Jurovitzki, A.L.; Ray, R.S.; Mohanty, S.K.; Misra, M., Supercapacitance Behavior of Porous Oxide Layer Grown on 302-type Stainless Steel Substrate, *J. Power Sources*, **2013**, *236*, 103-111.

34. Sarma, B.; Jurovitzki, A.L.; **Smith, Y.R.**; Mohanty, S.K.; Misra, M., Redox-Induced Enhancement in Interfacial Capacitance of Titania Nanotube/Bismuth Oxide Composite Electrode, *ACS Appl. Mater. Interfaces*, **2013**, *5*, 1688-1697.

35. **Smith, Y.R.**; Sarma, B.; Mohanty, S.K.; Misra, M., Single-Step Anodization for Synthesis of Hierarchical TiO2 Nanotube Arrays on Foil and Wire Substrate for Enhanced Photoelectrochemical Water Splitting, *Int. J. Hydrogen Energ.*, **2013**, *38*, 2062-2069.

36. **Smith, Y.R.**; Sarma, B.; Mohanty, S.K.; Misra, M., Light Assisted Anodized TiO_2 Nanotube Arrays, *ACS Appl. Mater. Interfaces*, **2012**, *4*, 5883-5890.

37. Chappanda, K.N.; **Smith, Y.R.**; Misra, M; Mohanty, S.K., Site-specific growth of TiO_2 nanotube arrays from e-beam evaporated thin titanium film on Si wafer, *Nanotechnology*, **2012**, *23*, 385601.

38. Mukerjee, B.; **Smith, Y.R.**; Subramanian, V. CdSe Nanocrystal Assemblies on Anodized TiO_2 Nanotubes: Optical, Surface, and Photoelectrochemical Properties, *J. Phys Chem C*, **2012**, *116*, 15175-15184 (*Featured on Issue Cover*).

39. Chappanda, K.N.; **Smith, Y.R.**; Mohanty, S.K.; Rieth, L.W.; Tathireddy, P.; Misra, M. Growth and characterization of TiO_2 nanotubes from sputtered Ti film on Si substrate, *Nano. Res. Lett.*, **2012**, *7*, 388. (Rated *'Highly Accessed'* by SpringerOpen)

40. Sarma, B.; **Smith, Y.R.**; Mohanty, S.K., Misra, M. Electrochemical Deposition of CdO on Anodized TiO_2 Nanotube Arrays for Enhanced Photoelectrochemical Properties, *Mater. Lett.*, **2012**, *85*, 33-36.

41. **Smith, Y.R.**; Sarma, B.; Mohanty, S.K., Misra, M. Formation of TiO_2-WO_3 Nanotubular Composite via Single-Step Anodization and its Application in Photoelectrochemical Hydrogen Generation, *Electrochem. Commun.*, **2012**, *19*, 131-134.

42. **Smith, Y.R.** and Subramanian, V., A new flexible quantum dot solar cell: heterostructural TiO_2 Mesh- TiO_2 nanoparticles photosensitized with CdS. *J. Phys Chem C*, **2011**, *115*, 7889-7886.

43. Deng, J.; Banerjee, S.; Mohapatra, S.K.; **Smith, Y.R.**; Misra, M., Bismuth iron oxide nanoparticles as photocatalyst for solar hydrogen generation from water. *J. Fund. Renew. Energ. Appl.* **2011**, *1*, 1-10 (*Invited Article*).

44. Raja, K.S.; **Smith Y.R.**; Kondamudi, N.; Manivannan, A.; Misra, M.; Subramanian, V., CO_2 photoreduction in the liquid phase over Pd-supported on TiO_2 nanotubes and bismuth titanate photocatalysts. *Electro. Sol. State Lett.* **2011**, *14*, 1-4.

45. Murugesan, S.; **Smith, Y. R.**; Subramanian, V., Hydrothermal synthesis of $Bi_{12}TiO_{20}$ nanostructures using anodized TiO_2 and its application in photovoltaics. *J. Phys. Chem. Lett.* **2010**, *1*, 1631-1636.

46. **Smith, Y.R.**; Raj, K.S.J.; Subramanian, V.; Viswanathan, B. Sulfated Fe_2O_3-TiO_2 synthesized from ilmenite ore: a visible light active photocatalyst. *Colloid. Surface. A*. **2010**, *367*, 140-147.

47. Raj, K.S.J.; **Smith, Y.R.**; Subramanian, V.; Viswanathan, B. Structural studies of silica modified titania and its photocatalytic activity of 4-chlorophenol oxidation in aqueous medium. *Indian J. Chem., Sect A*. **2010**, *49A* (July), 867-875.

48. **Smith, Y.R.**; Fuchs, A; Meyyappan, M. Investigation on process design and development of industrial scale synthesis of single-walled carbon nanotubes: a senior design project. *Chem. Eng. Educ.* **2010**, *44*(2), 166-171.

49. **Smith, Y.R.**; Kar, A; Subramanian, V. Investigation of physicochemical parameters that influence photocatalytic degradation of methyl orange over TiO_2 nanotubes. *Ind. Eng. Chem. Res.* **2009**, *48*, 10268-10276.

50. Kar, A; **Smith, Y.R.**; Subramanian, V. Improved degradation of textile dye using TiO_2 nanotubes formed over titanium wires. *Environ. Sci. Technol.* **2009**, *43*, 3260-3265.

51. Sohn, Y.S.; **Smith, Y.R.**; Subramanian, V.; Misra, M. Electrochemically assisted photocatalytic degradation of methyl orange using anodized titanium dioxide nanotubes. *Appl. Catal. B: Environ.* **2008**, *84*, 372-378.

Conference Proceedings/Publications

1. Marthi, R. and **Smith, Y.R.**, 2021. Lithium Adsorption Mechanism for Li2TiO3. In *Rare Metal Technology 2021* (pp. 19-27). Springer, Cham.

2. Marthi, R. and **Smith, Y.R.**, 2020. Selective Lithium Recovery from Brines Using Hydrothermally Treated Titania Slag. In *Rare Metal Technology 2020* (pp. 47-56). Springer, Cham.

3. Pinegar, H. and **Smith, Y.R.**, 2020. Mechanical Beneficiation of End-of-Life Lithium-Ion Battery Components. In *Energy Technology 2020: Recycling, Carbon Dioxide Management, and Other Technologies* (pp. 259-267). Springer, Cham.

4. Marthi, R. and **Smith, Y.R.**, 2018, Recovery of lithium from Great Salt Lake brine. In *Extraction 2018***,** 2695-2705.

5. **Smith, Y.R.** and Bogust, P., 2018, March. Review of Solar Silicon Recycling. In *TMS Annual Meeting & Exhibition* (pp. 463-470). Springer, Cham.

6. Marti, R. and **Smith, Y.R.**, 2018, March. Recovery of Lithium from Brine with MnO2 Nanowire Ion Sieve Composite. In *TMS Annual Meeting & Exhibition* (pp. 209-214). Springer, Cham.

7. **Smith Y.R.**; Nagel J.R.; Rajamani R.K., Electrodynamic Eddy Current Separation of End-of-Life PV Materials. In, *Energy Technology 2017*, Springer International Publishing, **2017**, 379-386.

8. **Smith, Y.R.**; Chappanda, K.N.; Mohanty, S.K.; Misra, M. TiO_2-WO_3 Nanotubular Composite Synthesized by Anodization of Simultaneous Multi-Target Sputtered Thin Films Characterized by Laser Ablation ICP-MS, *ECS Trans*., **2014,** *58*, 115-124.

9. Ogle, J.; Naglak, J.; Blue-Eyes, I.; Miller, C.; Baumbach, A.; Prentic, P.; **Smith, Y.R.**; Smith, R.N. Design and Development of a Sampling Platform to Study Long Range Seed Dispersal, In *OCEANS 2014 TAIPEI*, IEEE, **2014**, pp 1-8.

10. Jayamohan, H; **Smith, Y.R.**; Gale, B.K.; Mohanty, S.K.; Misra, M. Platinum Functionalized Titania Nanotube Array Sensor for Detection of Trichloroethlyene in Water, *Proc. Sensors 2013* (Baltimore, MD, 3-6 Nov. 2013) *IEEE*, **2013**, pp 1-4.

11. Sohn, Y.S.; **Smith**, **Y.R.**; Raja, K.S; Subramanian, V.; Misra, M. Sonoelectrochemical synthesis of low band gap titania nanotubes for photoelectrochemical generation of hydrogen. Proc. of SPIE Vol. 6650, 66500K-1-10. **2007**.

Books Edited

1. Sun Ziqi, Cong Wang, Donna Post Guillen, Neale R. Neelameggham, Lei Zhang, John A. Howarter, Tao Wang, Elsa Olivetti, Mingming Zhang, Dirk Verhulst, Xiaofei Guan, Allie Anderson, Shadia Ikhmayies, **York R. Smith**, Amit Pandey, Sarma Pisupati, Huimin Lu (Eds.). (2018). *Energy Technology 2018: Carbon Dioxide Management and Other Technologies*. Springer.

Book Chapters

1. **Smith, Y.R.**; Subramanian, V.; Viswanathan, B. Photo-electrochemical and Photo-catalytic Conversion of Carbon Dioxide. In *Photo-Electrochemistry & Photo-Biology for the Sustainability*; Kaneco, S., Viswanathan, B., Katsumata, H., Eds.; Union Press: Osaka, Japan, 2012; Volume 1, pp. 155–182.

Academic Publications

1. **Smith, Y.R.**, Self-Ordering Titania Nanotubular Arrays: Electrochemical Anodization, Functionalization, and Photoelectrochemical Applications, Ph.D. Dissertation, University of Utah, **2014**.
2. **Smith, Y.R.**, Physicochemical and Geometrical Factors that Influences the Photocatalytic Degradation Kinetics of a Model Water Contaminate, M.S. Thesis, University of Nevada, Reno, **2011**.

Featured/Highlights/Media

1. A collaborative art project featured in Time Square, New York City, March 2020. https://attheu.utah.edu/facultystaff/reverse-alchemy/
2. *Chemical & Engineering News*, Interview, 12/06/2017. (https://cen.acs.org/articles/95/web/2017/12/greener-way-lithium.html)
3. *International Innovation*, Web of Wisdom, "Progressive Procedures" Issue 148, pp 18-20 **2014**. (http://www.internationalinnovation.com/progressive-procedures/)

Manuscripts In-press/Under Review/Under Preparation

1. Marthi, R.; **Smith, Y.R.***, Role of stacking faults and hydroxyl groups on the lithium adsorption/desorption properties of layered H2TiO3 (under review)
2. **Smith, Y.R.***, Lithium: Resources, Recovery, and Recycling (under preparation).

Oral & Poster Presentations

1. **Smith, Y.R.** "Direct Lithium Extraction from Complex Brines" ***Invited***, Baker Hughes, (via Teams), 12-Jan-2022
2. **Smith, Y.R.** "Efficient Purification of Carbon Black Recovered from End-of-Life Tires for Reuse" ***Invited***, REMADE Institute Webinar Series, (via zoom), 21-Jul-2021.
3. **Smith, Y.R.** "Lithium: Resources, Recovery, and Recycling" ***Invited***, 2019-2020 SME Henry Krumb Lecturer, Presented at the SME Twin Cities Section (via zoom). 21-Jan-2021.
4. **Smith, Y.R.** "Lithium: Resources, Recovery, and Recycling" ***Invited***, 2019-2020 SME Henry Krumb Lecturer, Presented at the Morenci SME Section (via zoom). 09-Dec-2020.

5. **Smith, Y.R.** "Lithium: Resources, Recovery, and Recycling" ***Invited***, 2019-2020 SME Henry Krumb Lecturer, Presented at the Southern California SME Section (via zoom). 21-Mar-2020.

6. Marthi, R.; **Smith, Y.R.** "Carbon Black from Waste Tires: Purification Strategies and Recycle Potential" Presented at TMS Annual Meeting & Exhibition 2020, San Diego, CA 25-Feb-2020.

7. Marthi, R.; **Smith, Y.R.** "Selective Lithium Recovery from Brines using Hydrothermally Treated Titania Slag" Presented at TMS Annual Meeting & Exhibition 2020, San Diego, CA 24-Feb-2020.

8. Pinegar, H.; **Smith, Y.R.** "Mechanical Beneficiation of End-of-Life Lithium-Ion Battery Components" Presented at TMS Annual Meeting & Exhibition 2020, San Diego, CA 26-Feb-2020.

9. Pinegar, H.; **Smith, Y.R.** "An Overview of the Recycling Processes and Technologies for Spent Lithium Ion Batteries" Presented at TMS Annual Meeting & Exhibition 2018, San Antonio, TX. 12-Mar-2019.

10. **Smith, Y.R.** "Lithium: Resources, Recovery, and Recycling" Presented at the Annual SME Meeting 2019, Denver, CO. 26-Feb-2019.

11. Bogust, P.; **Smith, Y.R.**, "Comminution and Separation of Photovoltaic Panel Materials for Recycling" presented at TMS Annual Meeting & Exhibition 2018, Phoenix, AZ. 14-Mar-2018.

12. Marthi, R.; **Smith, Y.R.** "Recovery of Lithium from Brine with MnO2 nanowire ion sieve composite" presented at TMS Annual Meeting & Exhibition 2018, Symposium on Rare Metal Extraction & Processing. Phoenix, AZ 13-Mar-2018.

13. Bogust, P.; **Smith, Y.R.**, "Comminution and Separation of End-of-Life Photovoltaic Materials" Presented at the 33rd European Union Photovoltaic and Solar Energy Conference 2017, RAI Conference Centre, Amsterdam, The Netherlands, 28-Sept-2017

14. **Smith, Y.R.**; Bogust, P.; Rajamani, R.K., ***Invited*** Poster "Comminution and Electrodynamic Eddy Current Separation Studies of End-of-Life Photovoltaic Materials" Presented at the IEEE Photovoltaic Specialists Conference 2017, Marriott Wardman Park Hotel, Washington D.C., 28-Jun-2017

15. **Smith, Y.R.**; Nagel, J.R.; Rajamani, R.K., "Electrodynamic Eddy Current Separation of End-of-Life PV Materials" Presented at the 2017 TMS Annual Meeting, San Diego Convention Center, San Diego, CA, 02-Mar-2017.

16. **Smith, Y.R.** "Anodic Synthesis, Functionalization, and Applications of Metal Oxide Nanotube Arrays" Presented at the 2017 TMS Annual Meeting, San Diego Convention Center, San Diego, CA, 01-Mar-2017.

17. **Smith, Y.R.** "Anodic Titania Nanotubes Under the Sun: Clean Water, Make Fuels, and Detect Disease" ***Invited*** Presented at Fort Lewis College, Durango, CO, 14-Nov.-2016

18. **Smith, Y.R.** "Lithium: Recovery, Resources, and Recycling" Presented at the University of Utah, Metallurgical Engineering Department Graduate Seminar, Salt Lake City, UT, 21-Sept-2016.

19. Werner, J. and **Smith, Y.R.** "Alterative Pathways for Engineering Education for the 21st Century" Presented at the University of Utah, Chemical Engineering and Metallurgical Engineering Department Graduate Seminar, Salt Lake City, UT, 10-Feb-2016.

20. **Smith, Y.R.** and Misra, M. "Photocatalytic Microfluidic Reactors Utilizing Titania Nanotubes for Degradation of Organic and Biological Contaminates" ***Invited***, Presented at the Energy, Materials, and Nanotechnology Meeting on Photocatalysis, New York New York Casino, Las Vegas, NV, 22-Nov-2015.

21. **Smith, Y.R.**; Bhattacharyya, B.; Misra, M. "Adsorption of Aqueous Rare Earth Elements Onto Pyrolyzed Recycled Tires" Presented at the 2015 AIChE Annual Meeting, Salt Palace Convention Center, Salt Lake City, UT, 12-Nov-2015.

22. **Smith, Y.R.**; Jayamohan, H.; Misra, M. "Photocatalytic Degradation and Microbial Inactivation Utilizing Titania Nanotube Arrays in a Microfluidic Format" Presented at the 2015 AIChE Annual Meeting, Salt Palace Convention Center, Salt Lake City, UT, 09-Nov-2015.

23. Bhattacharyya, B.; **Smith, Y.R.**; Misra, M.; Mohanty, S.K. "A Comparison of Cobalt and Gold Functionalized TiO2 Nanotubes Based Sensing Platform for Enhanced Electrochemical Detection of Voltatile Organic Biomarkers" Presented at the 2015 AIChE Annual Meeting, Salt Palace Convention Center, Salt Lake City, UT, 09-Nov-2015.

24. **Smith, Y.R.**; Bhattacharyya, D.; Mohanty, S.K.; Misra, M. "Electrocehmical Detection of Organic Biomarkers Using Next Generation Titania Nanotube Arrays" Presented at the 227th Electrochemical Society Meeting, The Hilton Chicago, Chicago, IL, 27-May-2015.

25. **Smith, Y.R.**; Jayamohan, H.; Hansen, L.; Mohanty, S.K.; Gale, B.K., Misra, M.; "Microfluidic Photocatalytic Device Utilizing Anodized Titania Nanotube Arrays: Application and Simulation Validation" Presented at the 227th Electrochemical Society Meeting, The Hilton Chicago, Chicago, IL, 26-May-2015.

26. Bhattacharyya, B.; **Smith, Y.R.**; Mohanty, S.K.; Misra, M. "Electrochemical Detection of Four Prominent Tuberculosis Biomarkers Using Functionalized Titania Nanotube Array Sensing Platform" Presented at the 227th Electrochemical Society Meeting, The Hilton Chicago, Chicago, IL, 26-May-2015.

27. **Smith, Y.R.** "Functionalized 1D Titania Nanotube Arrays: A Volatile Organic Sensing Platform" ***Invited***, Chemical & Materials Engineering Department Seminar, University of Nevada, Reno, Reno, NV, 23-Sept-2014

28. **Smith, Y.R.** "What's in our Breath?" ***Invited***, TEDxReno, Lear Theater, Reno, NV, 06-June-2014 (https://www.youtube.com/watch?v=oIPsn0nJdRE.)

29. **Smith, Y.R.** and Misra, M. "Self-Ordering Titania Nanotube Arrays formed via Electrochemical Anodization" ***Invited***, National Centre for Catalysis Research, Indian Institute of Technology-Madras, Chennai, India, 26-Dec-2013.

30. **Smith, Y.R.** and Misra, M. "Effect of Mn or Co Coping on the Photoelectrochemical Responses of CdS Sensitized Titania anotubular Arrays" Presented at the International Union of Materials Research Societies Meeting- International Conference Asia (IUMRS-ICA), J.N. Tata National Science Complex, Bangalore, India, 20-Dec-2013.

31. **Smith, Y.R.**; Kim, Y.; Mohanty, S.K.; Misra, M. "Point-of-Care Detection of Volatile Organic Compound Biomarkers from *Mycobacterium tuberculosis* by Breath Analysis Using Self-Organizing Titania Nanotube Arrays" Presented at the International Union of Materials Research Societies Meeting- International Conference Asia (IUMRS-ICA), J.N. Tata National Science Complex, Bangalore, India, 16-Dec-2013.

32. **Smith, Y.R.**; Chappanda, K.N.; Mohanty, S.K.; Misra, M. "TiO_2-WO_3 Nanotubular Composite Synthesized by Anodization of Simultaneous Multi-target Sputtered Thin Films Characterized by Laser Ablation ICP-MS" Presented at the 224th Electrochemical Society Meeting, Oxide Films: Symposium in Honor of Clive Clayton on his 65th Birthday, The Hilton San Francisco Hotel, San Francisco, CA, 30-Oct-2013

33. **Smith, Y.R.**; Sarma, B.; Jurovitzki, A.L.; Mohanty, S.K.; Misra, M. "Titania Nanotube Array/Bismuth Oxide Interfacial Capacitance Electrode" Presented at the 224th Electrochemical Society Meeting, The Hilton San Francisco Hotel, San Francisco, CA, 30-Oct-2013

34. **Smith, Y.R.**; Gakhar, R.; Chidambaram, D.; Misra, M. "Doped Quantum Dot Sensitized Photoelectrochemicel Cell for Enhanced Solar Fuel Generation" Poster presented at the 8th Annual NanoUtah Conference, University of Utah, Salt Lake City, UT, 19-Oct-2013

35. Chidambaram, D; Misra, M.; **Smith, Y.R.** "Photoelectrochemical Generation of Hydrogen from Water Using Nanotube-Based Semiconductor Systems for Improved Visible Light Activity" Poster Presentation at the U.S. Department of Energy Hydrogen Program Review, Marriott Hotel, Arlington, VA, 16-May 2013

36. **Smith, Y.R.** "Solar Energy Conversion & Storage: Small Materials and Big Ideas" Presented at the Metallurgical Engineering Seminar Series, University of Utah, 30-Jan-2013.

37. Misra, M.; **Smith, Y.R.**; Chidambaram, D. "Photoelectrochemical Generation of Hydrogen from Water Using Nanotube-Based Semiconductor Systems for Improved Visible Light Activity" Poster presented at the U.S. Department of Energy Hydrogen Program Review, Marriott Hotel, Arlington, VA, 15-May 2012.

38. Chappanda, K.N.; **Smith, Y.R.**; Mohanty, S.K.; Reith, L.W.; Tathireddy, P.; Misra, M. "Growth and characterzation of TiO_2 nanotubes from sputtered Ti film on Si substrate" Poster

presentation at 8th International Conference on Porous Semiconductors- Science and Technology, Malaga, Spain, 27-Mar 2012.

39. **Smith, Y.R.**; Sarma, B.; Mohanty, S.K., Misra, M. "Formation of TiO_2-WO_3 Nanotubular Composite via Single-Step Anodization and its Application in Photoelectrochemical Hydrogen Generation" ***Invited*** presentation at the 243rd American Chemical Society National Meeting & Exposition, San Diego Conference Center, San Diego, CA, 25-Mar 2012.

40. Misra, M; Mohanty, S.K.; **Smith, Y.R.**, "Functionalized 1D TiO_2 Nanotubes for Chemical and Diagnostic Sensors" Presented at the 7th Annual NanoUtah Conference, Hilton City Center, Salt Lake City, UT, 14-Oct 2011.

41. **Smith, Y.R.** and Subramanian, V., "Photocatalytic Degradation of Methyl Orange Using Hydrothermally Synthesized Bismuth Titanate ($Bi_{12}TiO_{20}$)." Presented at the 219th Electrochemical Society Meeting, The Palais des Congres de Montreal, Montreal Canada, 03-May 2011.

42. **Smith, Y. R.**; Murugesan, S.; Subramanian, V., "Hydrothermal synthesis of $Bi_{12}TiO_{20}$ nanostructures using anodized TiO_2 and its applications." Presented at the 218th Electrochemical Society Meeting, Riviera Hotel, Las Vegas, NV, 13-Oct. 2010.

43. **Smith**, **Y.R.** "Let the Sun do All the Work" Presented at AIChE UNR student chapter, University of Nevada, Reno, Nevada. Nov 2008.

44. **Smith**, **Y.R.**; Patel, J; Smith, K. "Investigation on Process Design and Development of Industrial Scale Synthesis of Single-walled Carbon Nanotubes". Presented at the NASA-Ames National Research Center, Moffett Field, California. 02-May 2008.

45. **Smith**, **Y.R.** "Electrochemically assisted photocatalytic degradation of methyl orange using anodized titanium dioxide nanotubes" Presented at Nevada Undergraduate Research Symposium, University of Nevada, Reno, Reno, Nevada. 17-Apr-2008.

46. **Smith**, **Y.R.** "Advanced Inorganic Materials: Development of Photovoltaic and Photocatalytic Systems." Presented at AIChE UNR student chapter, University of Nevada, Reno, Reno, Nevada. 12-Oct 2007.

Teaching Experience

Instructor

MET E 7910: Adv Computational Methods in Met. Eng. (2 credits) Fall 2018
Metallurgical Engineering Department
University of Utah

MET E 5760/6760: Process Design & Economics I (4 credits) Spring 2017-2022
Metallurgical Engineering Department
University of Utah

MET E 5760/6760: Process Design & Economics II (3 credits) Spring 2021-2022

Metallurgical Engineering Department
University of Utah

MET E 3610: Metallurgical Engineering Thermodynamics I (3 credits) Spring 2019-2022
Metallurgical Engineering Department
University of Utah

MET E 3500: Fluid Flow (2 credits + 1 credit lab) Spring 2017-2018
Metallurgical Engineering Department
University of Utah

MET E 3220: Material & Energy Balances (2 credits) Fall 2016-2017
Metallurgical Engineering Department
University of Utah

MET E 3200: Computational Methods in Met. Eng. (3 credits) Fall 2018-2019
Metallurgical Engineering Department
University of Utah

MET E 1001: Renewable Energy (3 credits) Spring 2015-2016
Metallurgical Engineering Department
University of Utah

Awards, Fellowships & Certifications

- Henry Krumb Lecturer 2019-2020, Society of Mining, Metallurgy & Exploration
- U.S. DOE EERE SunShot Postdoctoral Research Award, 2015-2016
- Nevada State Board Engineer Intern (FE exam pass, EI#: 0T5730)

Service Activities

- Associate Editor, *Mining, Metallurgy & Exploration*, 2019-present
- Strategic Advisory Committee, The REMADE Institute, 2019- present
- Mineral Processing Division Scholarship Committee, Member (2019-2020), Chair, 2021-2022)
- Accreditation & Curriculum Issues Subcommittee, SME, 2019-2020
- Mineral Industry Education Award Committee, Mineral Processing Division, SME, 2019

University/College/Department Service & Committees

- Assessment Advisory Board, Member, University of Utah (2021-)
- Allocation Committee Member, Sustainable Campus Initiative Fund, University of Utah (2017-2019)
- IT Committee- College of Mines and Earth Sciences (2018-)
- CMES Proposal Review Committee- College of Mines and Earth Sciences (2021-2022)
- Graduate Admission Committee- Metallurgical Engineering Program (2017-2021)
- ABET Program Coordinator- Metallurgical Engineering Program (2016-2021)
- Curriculum Committee- Department of Materials Science & Engineering (2017-)

- Faculty Search Committee- Department of Materials Science & Engineering (2021-2022)
- Contributed and participated in numerous college and department outreach activates (e.g., Science Day and Engineering Day, lab tours and open houses)

Organizing Committee of Conferences/Chairing Sessions

- SME 2019-2020, Industrial Minerals & Aggregates: Energy and Critical Minerals, Co-Chair
- TMS 2017-2019, Solar Silicon Symposium, Co-Chair

Student Advising

Current Students

Padma Krishnakumar (Ph.D. student, Metallurgical Engineering)
Rahulkumar Singh, co-advising, (Ph.D. student, Metallurgical Engineering)
Peilin Yang (M.S., Metallurgical Engineering)

Benjamin Schroeder, Crus Scholar (undergraduate, Metallurgical Engineering)

Former Graduate Students Advised

Raja Marthi (Ph.D., Metallurgical Engineering, 2021), Queen's University (postdoc)
Haruka Pinegar (Ph.D., Metallurgical Engineering, 2020), Argonne National Laboratory (postdoc)
Raja Marthi (M.S., Metallurgical Engineering, 2018)
Pamela Bogust (M.S., Metallurgical Engineering, 2018), Varex Imaging (R&D Engineer)

Former Undergraduate Students Advised

Ruben Ochoa, Honors Thesis, Crus Scholar (Metallurgical Engineering)
Tanner Livingston, Crus Scholar (Metallurgical Engineering)
John Kaman, NSF-REU (Materials Science & Engineering, Iowa State University)
Vincent He, NSF-REU (Chemical Engineering, UC Santa Barbara)

Former Visiting Scholars and Scientists

Anupam Srivastav, Dayalbagh Educational Institute, India, visiting PhD student supported by the Bhaskara Advanced Solar Energy (BASE) Fellowship Program

Advisory Committees

Amr Abdelghany (Ph.D., Metallurgical Engineering, 2018)
Veeren Babu Atluri (Ph.D., Metallurgical Engineering, 2019)
Siddarth Agrawal (Ph.D., Chemical Engineering, 2020)
Sanket Bucchuwar (M.S., Metallurgical Engineering, 2018)
Kathryn Chabal (Ph.D., Chemistry)
Fan Deqiu (Ph.D., Metallurgical Engineering, 2018)
Mario Gonzalez (M.S., Metallurgical Engineering, 2018)
Jake Graser (Ph.D., Material Science & Engineering, 2020)
David Horvath (Ph.D., Metallurgical Engineering, 2018)
Weiping Liu (Ph.D., Metallurgical Engineering, 2019)
Parker Okabe (Ph.D., Nuclear Engineering, 2020)
Alberto Puga (Ph.D., Metallurgical Engineering, 2021)
Syamantak Roy (Ph.D., Metallurgical Engineering, 2022)

Rahul Sarkar (Ph.D., Metallurgical Engineering, 2019)
Puvvada Sindhoora (Ph.D., Metallurgical Engineering, 2019)
Milan Stika (Ph.D., Metallurgical Engineering, 2017)
Seethapathi Rao Latchireddi (Ph.D., Metallurgical Engineering, 2017)
Erik Sunberg (M.S., Metallurgical Engineering, 2017)
Manish Wasnik (Ph.D., Metallurgical Engineering, 2020)
Joshua Werner (Ph.D., Metallurgical Engineering, 2017)
Chenguang Yang (Ph.D., Metallurgical Engineering)
Chao Zhang (Ph.D., Metallurgical Engineering, 2019)
Huan Zhang (Ph.D., Metallurgical Engineering, 2020)
Zongliang Zhang (Ph.D., Metallurgical Engineering, 2020)