TOLGA AYTUG
Oak Ridge National Laboratory, P. O. Box 2008, Bldg: 4100, MS 6100, Oak Ridge, TN 37831
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EDUCATION:

University of Kansas, Lawrence, KS	Ph.D.	2000	Physics
Middle East Technical University, Ankara, Turkey	MS	1994	Physics
Middle East Technical University, Ankara, Turkey	BS	1991	Physics

APPOINTMENTS:

2007-Present **Distinguished Research Staff Member:** Oak Ridge National Laboratory, Oak Ridge, TN
2007-Present **Adjunct Professor:** University of Tennessee, Dept. of Phys., Knoxville, TN
2003-2007 **Research Assistant Professor:** University of Tennessee, Dept. of Phys., Knoxville, TN
2000-2003 **Post-doctoral Research Associate:** Oak Ridge National Laboratory, Oak Ridge, TN
1999-2000 **Post-graduate Research Associate:** Oak Ridge National Laboratory, Oak Ridge, TN
1997-1999 **Research/Teaching Assistant:** University of Kansas, Lawrence, KS

PUBLICATIONS, PATENTS, & PRESENTATIONS: (h-index=37)

- 3 book chapters and over 150 articles in refereed journals (a list is attached)
- 25 US patents, 21 issued and 4 pending
- Numerous invited and contributed presentations at professional conferences

AWARDS, HONORS & GRANTS:

2023 - UT-Battelle (ORNL) Research Accomplishment Award.
2021 – R&D100 Award for UCC: Ultraconductive Copper-CNT Composites
2020 - Battelle Celebration of Solvers Award.
2019 - UT-Battelle (ORNL) Inventor of the Year Award.
2017 - UT-Battelle (ORNL) Technology Transfer Award.
2017 - National Federal Laboratory Consortia Award for excellence in technology transfer for Superhydrophobic Transparent Glass Thin Film Innovation License to Samsung.
2017 - ORNL Significant Event Award for licensing of the optically transparent nanostructured superhydrophobic coatings technology to Samsung.
2015 - R&D 100 Award for Multifunctional Superhydrophobic Transparent Glass Coating.
2014 - UT-Battelle (ORNL) Research Accomplishment Award.
2014 - R&D 100 Award for The Super-hydro-tunable HiPAS Membranes.
2014 - ORNL Significant Event Award for licensing of the technology on optically transparent nanostructured superhydrophobic coatings to United Protective Technologies.
2012 - R&D 100 Award for Low-Cost Plasma Processing System for Research and Pilot Production.
2011 - Southeast and National Federal Laboratory Consortia Award for excellence in technology transfer for flexible thin-film solar photovoltaics on RABiTS.
2010 - R&D 100 Award for High-Performance, High-Tc Superconducting Wires Enabled via Self-Assembly of Non-Superconducting Columnar Defects.
2009 - ORNL Significant Event Award for establishment of metal organic chemical vapor deposition (MOCVD) capabilities at ORNL to produce high-performance superconductor films.

2008 - ORNL Significant Event Award for development of IBAD based second generation superconducting wires.
2006-2008 - American Chemical Society, Petroleum Research Grant.
2007 - **Southeast** and **2008 - National Federal Laboratory Consortia Award** for excellence in technology transfer of $LaMnO_3$ – buffers to fabricate high-performance, high-temperature superconducting tapes.
2007 - R&D 100 Award for High-Performance $LaMnO_3$-Enabled, High Temperature Superconducting Tape.
2006 - ORNL Excellence in Technology Transfer Award, Oak Ridge National Laboratory.
2004 - Exceptional Accomplishment, U.S.D.O.E. Superconductivity Program Peer Review.
1994 - 1998 Turkish Higher Education Council Fellowship. This is the highest level of fellowship awarded in Turkey for exceptional students to study abroad.

PROFESSIONAL ACTIVITIES/MEMBERSHIPS:

- Editorial Board Member, Superconductor Science and Technology (2010-present)
- Associate Technical Editor, IEEE Transactions on Applied Superconductivity (2008-present)
- Symposium organizer: Materials Science and Technology Conference (2006), Materials Research Society Spring Meeting (2008), The Minerals, Metals & Materials Society Annual Meeting (2019, 2020, 2021)
- Organizer for symposium entitled "Advances in superconductivity: Heterostructures, Materials Functionalization, and Nanoscale Optimization" in the Materials Research Society, Spring 2008
- Co-organizer for symposium entitled "Nanostructured Materials: Synthesis, Characterization and Applications" in the Materials Science and Technology Conference 2006
- Reviewer of professional journal articles (e.g. J. Matter. Res., Physica C, Appl. Phys. A, IEEE Trans. on Appl. Supercond., Supercond. Sci. and Technol., J. Elec. Matter., Physical Review B, Appl. Surf. Sci., etc.)
- Session chairman at numerous symposia
- Member: Sigma Xi Scientific Research Society, Materials Research Society, American Chemical Society
- Ph.D. thesis advisor (University of Tennessee), Mentor for undergraduate interns, visiting high-school teachers and university faculty seeking research experience

RESEARCH INTEREST & EXPERTISE:

- Epitaxial growth of thin film heterostructures using various techniques including *dc* and *rf*-magnetron sputtering, pulsed laser ablation, electron beam evaporation, metal organic chemical vapor deposition (MOCVD) and chemical solution (Metal Organic Decomposition and Sol-Gel) approaches
- Epitaxial thin film multilayers of ferroelectric perovskites, magnetoresistive oxides, nitrides and metals on single crystals and textured metal substrates.
- Relationships between film microstructure, defects, and diffusion properties on an atomic scale
- Thermodynamic and kinetic effects on phase nucleation, structure formation and stability of oxide and nitride thin films
- Physical, chemical, and electrical properties of superconducting materials, oxide, nitride, metal and CMR thin films including electrical transport and magnetic properties
- Process development for electrically conductive MXene–polymer nanocomposite films
- Synthesis and design of window, absorber, and electrode layers for thin film-based photovoltaics on glass and flexible materials

- Novel approaches for the development of transparent and non-transparent nanostructured superhydrophobic coatings
- Photonic processing approaches for conductive interconnects based on nanoparticle inks for printed flexible electronics
- Integrative design of high-performance graphene based electrode materials for all-solid-state, optically transparent flexible supercapacitors on polymer platforms
- Chemical synthesis approaches for the development of novel radiation resistant polymer-ceramic based nanocomposite dielectric materials for nuclear environments
- Processing strategies for insulating and conducting oxide and nitride thin films as buffer layers on biaxially textured Cu, Ni and Ni-alloy tapes
- Synthesis and characterization of bulk and thin films of mercury-, thallium- and yttrium-based high temperature superconducting cuprates
- Ion and neutron irradiation effects on the physical/chemical and microstructural properties of nanoparticle doped yttrium-based high temperature superconductors
- Effects of gamma radiation on the mechanical and electrical properties of the composite polymer systems
- Mechanisms of magnetic vortex phenomena in high-temperature superconducting films
- Synthesis of two-dimensional, self-organized arrays of various oxide and metal nanoparticles with controlled size, orientation, and concentration on technological substrates
- Effects of nanoparticle surface engineering on flux-pinning properties of superconducting films
- Synthesis and formation of chemically phase separated and structurally self-assembled composite structures in epitaxial thin films
- Processing strategies for the fabrication and electrical stabilization of high critical current density superconducting wires
- Novel processing strategies for carbon nanomaterial enabled ultra-conductive metal (Cu or Al) composites
- Metallization layers, die-attach materials and assembly concepts for high temperature power electronics packaging
- Design concepts and fabrication of integrated high temperature, high frequency thin film ceramic capacitors for power electronic modules

SKILLS:

- X-ray diffraction: powder, texture and pole figure analysis
- Microscopy: SEM/EDAX, AFM, and Optical; Profilometry
- Spectroscopy: XAS, SAM, RBS, SIMS, and Optical (UV-Vis-NIR transmittance and reflectivity)
- Mechanical: Dynamic mechanical analysis, uniaxial tensile measurements
- Electrochemical characterization techniques
- Static and dynamic contact angle measurements
- Residual gas and thermal gravimetric analysis
- Electrical transport by four-point technique and Hall-effect measurements
- Vacuum techniques, deposition equipment, roll-to-roll equipment and processing
- *Rf*- and *dc*-magnetron sputtering, MOCVD, CVD, Screen-printing, Tape-casting, Spin- and dip-coating techniques
- Photonic curing techniques using pulsed thermal processing
- Air-sensitive techniques and equipment (e.g., Schlenk apparatus and dry box)
- Thin film patterning using photolithography

PATENTS:

1. Inventor, “Anti-fingerprint coatings”, U.S. Patent No. 12,163,052B2; Dec. 10, 2024
2. Inventor, “Fluid storage media and method of delivering a fluid”, U.S. Patent No. 12,090,461 B2; Sept. 17, 2024
3. Inventor, “Coated hollow and evacuated insulation spheres (CEIS)”, U.S. Patent No. 12,005,414; June 11, 2024
4. Inventor, “Metal-carbon composites and methods for their production”, U.S. Patent No. 11,325,348; May 10, 2022
5. Inventor, “Anti-fingerprint coatings”, U.S. Patent No. 11,292,919; Apr. 5, 2022
6. Inventor, “Superhydrophobic transparent glass (STG) thin film articles”, U.S. Patent No. 11,292,288; Apr. 5, 2022
7. Inventor, “Transparent omniphobic thin film articles”, U.S. Patent No. 10,844,479; Nov. 24, 2020
8. Co-inventor, “Super-surface selective nanomembranes providing simultaneous high permeation flux and high selectivity, U.S. Patent No. 10,179,313; Jan. 15, 2019
9. Inventor, “Superhydrophobic films and methods for making superhydrophobic films”, U.S. Patent No. 9,771,656; Sept. 26, 2017
10. Inventor, “Optically transparent, superhydrophobic, biocompatible thin film coatings and methods for producing same”, U.S. Patent No. 9,752,049; Sept. 5, 2017
11. Co-inventor, “Super-surface selective nanomembranes providing simultaneous high permeation flux and high selectivity”, U.S. Patent No. 9,308,501; Apr. 12, 2016
12. Inventor, “Superhydrophobic transparent glass (STG) thin film articles”, U.S. Patent No. 8,741,158; June 3, 2014
13. Inventor, “Hetero-junction photovoltaic device and method of fabricating the device”, U.S. Patent No. 8,647,915; Feb 11, 2014
14. Inventor, “Method for producing microstructured templates and their use in providing pinning enhancements in superconducting films deposited thereon”, U.S. Patent No. 8,486,864; July 16, 2013
15. Inventor, "Phase separated, epitaxial composite cap layers for electronic device applications, and method of making the same", U.S. Patent No. 8,221,909, July 17, 2012
16. Co-inventor, “Chemical Solution Deposition Method of Fabricating Highly Aligned MgO Templates”, U.S. Patent No. 8,088,503; Jan 3, 2012.
17. Co-inventor, “Chemical Solution Deposition Method of Fabricating Highly Aligned MgO Templates”, U.S. Patent No. 7,553,799 B2; June 30, 2009.

18. Co-inventor, "Superconductors on Iridium Substrates and Buffer Layers", U.S. Patent No. 7,432,229 B2; October 7, 2008.

19. Co-inventor, "Method of Depositing an Electrically Conductive Oxide Buffer Layer on a Textured Substrate and Articles Formed There from," U.S. Patent No. 6,956,012; October 18, 2005.

20. Co-inventor, "Buffer Layers and Articles for Electronic Devices," U.S. Patent No. 6,764,770; July 20, 2004.

21. Co-inventor, "Method of Depositing an Electrically Conductive Oxide Buffer layer on a Textured Substrate and Articles Formed There from," U.S. Patent No. 6,617,283 B2; September 9, 2003.

BOOK CHAPTERS:

1. **T. Aytug** in: "Applied Superconductivity, Handbook on Devices and Applications (2015), Wiley-VCH" DOI:10.1002/9783527670635, **ISBN:** 9783527670635

2. **T. Aytug** in: "Flux Pinning and AC Loss Studies on YBCO Coated Conductors (2007), Nova Science Publishers" **ISBN:** 9781600216923

3. **T. Aytug** in: "Cellulose Nanofibrils Composite Films (2024), IGI Global". DOI: 10.4018/979-8-3693-0003-9, **ISBN:** 9798369300039

PUBLICATIONS:

1. B. P. Thapaliya, A. S. Ivanov, S. Gao, H.-Y. Chao, M. Lamm, a. Ganesan, M. Chi, H. M. Meyer III, X.-G. Sun, **T. Aytug**, S. Dai, and S. M. Mahurin, "Transforming CO2 to Porous Carbon as a High-Performing Sodium-Ion Battery Anode via Electrochemical Reduction in Molten Carbonates," ACS Sustainable Chem. Eng., DOI: 10.1021/acssuschemeng.4c10896

2. K. Li, H. Jiang, M. McGuire, M. Yoon, A. Lupini, F. List, C. Bowland, N. Amit, P. Paranthaman, K. Nawaz, E. Lara-Curzio, J. Haynes and **T. Aytug**, "High Performance Multilayered Cu-CNT Composite Architectures for Advanced Conductors," submitted to Composites Part B

3. M. Yoon, G. D. Samolyuk, K. Li, J. A. Haynes, and **T. Aytug**, "First-Principles Calculations of the Electrical Conductivity of Carbon Nanotubes Functionalized with Copper and Nitrogen: Implications for Electronics, Energy Storage, and Nanodevices," ACS Appl. Nano Mater., 7, 26777-26784, (2024), DOI:10.1021/acsanm.4c04500

4. M. E. Lamm, B. L. Armstrong, S. Chowdhury, B. W. Lamm, **T. Aytug**, K. Li, R. Duckworth, J. A. Haynes, "High performance Calcium Copper Titanate/Polyimide Dielectrics Composites Enabled Through Colloidal Stabilization," Polym. Compos., 1-10, (2024), DOI: 10.1002/pc.29132

5. H. Jiang, L. Cooke, K. Srivilliputhur, M. A. McGuire, H. M. Meyer III, M. Yoon, J. Haynes, K. Nawaz, A. R. Lupini, K. Li, and **T. Aytug**, "Copper–Carbon Nanotube Composites Enabled by

Brush Coating for Advanced Conductors," ACS Appl. Nano Mater., (2024), DOI:10.1021/acsanm.4c00679

6. G. Yang, F. Shi, Y. Guo, J. Lai, R. Sacci, C. Liu, M. Wang, N. Liu, X. Zhao, **T. Aytug**, D. Mitlin, J. Nanda, M. Kamaludeen, "Dissecting the Silicon Anode Solid-Electrolyte Interphase (SEI): From Liquid to Solid Electrolytes through Advanced Characterization Techniques," Chem. Rev. (2024)

7. B. P. Thapaliya, A. S. Ivanov, H.-Y. Chao, M. Lamm, H. M. Meyer III, M. Chi, X.-G. Sun, **T. Aytug**, S. Dai, and S. M. Mahurin, "Low-Temperature Molten Salt Electrochemical CO_2 Upcycling for Advanced Energy Materials," ACS Appl. Mater. Interfaces, 16, 2, 2251–2262 (2024), DOI: 10.1021/acsami.3c14858.

8. K. Li, M. S. Kesler, M. A. McGuire, M. Zhang, **T. Aytug**, H. Jiang, D. S. Sholl, E. Lara-Curzio, M. Thompson, Z. P. Tener, and K. Nawaz, "Magnetic Nanoparticles Induced Sorbent Regeneration for Direct Air Capture," AIChE, (2024), DOI:10.1002/aic.18500.

9. K. Li, T. Smith, M. Zhang, S. Y. Motta, M Muneeshwaran, H. Jiang, **T. Aytug,** A. Naskar, E Lara-Curzio, K. Nawaz, "Additive Manufactured Polymer Composites for Heat Exchanger Applications: Compatibility Analysis with Refrigerants," in progress (2024).

10. K. Araño, G. Yang, B. Armstrong, **T. Aytug**, M. Chambers, E. Self, H. Meyer III, J. Quinn, J. Browning, C. Wang, and G. Veith, "Carbon Coating Influence on the Formation of Percolating Electrode Networks for Silicon Anodes," ACS Appl. Energy Mater., 6, 21, 11308–11321 (2023), DOI: 10.1021/acsaem.3c02205.

11. H. Jiang, D. E. Graham, A. Hollander, M. P. Paranthaman, M Muneeshwaran, X. Liu, M. Theodore, **T. Aytug**, K. An, K. Li, and K. Nawaz, "Quaternary Ammonium Salt Coated Air Filter for Bioaerosol Removal from Building Indoor Air," Build. Environ., 250, 111158 (2024), DOI: 10.1016/j.buildenv.2023.111158

12. H. Jiang, K. Li, M Muneeshwaran, X. Liu, K. An, X. Zhao, S. Ozcan, **T. Aytug,** K. Nawaz, "A review of antimicrobial implications for improving indoor air quality," J. Mater. Sci., 59, 13725–13755, (2024), DOI: 10.1007/s10853-024-09989-4

13. B.P. Thapaliya, A.S. Ivanov, H-Y. Chao, M. Lamm, M. Chi, H.M. Meyer, X-G. Sun, **T. Aytug**, and S. Dai, "Molten Salt Electrochemical Upcycling of CO2 to Graphite for High Performance Battery Anodes," Carbon 212, 1181151 (2023), DOI: 10.1016/j.carbon.2023.118151.

14. M. L. Whittaker, E. Crumlin, W. Dong, K. Li, **T. Aytug**, H. M. Meyer, S. F. Evans, B. A. Moyer, and M. P. Paranthaman, "Cooperative Lithium Sorption in Layered Double Hydroxides is Modulated by Colloidal (Dis)assembly," Chem. Matter., DOI:10.1021/acs.chemmater.3c00072, (2023).

15. C. Fisher, L.N. Skolrood, K. Li, P.C. Joshi, and **T. Aytug**, "Aerosol-Jet Printed Sensors for Environmental, Safety, and Health Monitoring: A Review," Adv. Mater. Technol., 2300030, DOI: 10.1002/admt.202300030, (2023).

16. M.E. Lamm, K. Li, J. Atchley, S.S. Shrestha, S.M. Mahurin, D. Hun, and **T. Aytug**, "Tailorable Thermoplastic Insulation Foam Composites Enabled by Porous-Shell Hollow Glass Spheres and

Expandable Thermoplastic Microspheres," Polymer **267**, 125652, DOI:10.1016/j.polymer.2022.125652 (2023)

17. B. LaRiviere, P. Ramuhalli, F.K. Reed, P.C. Joshi, M.N. Ericson, **T. Aytug**, M.L. Crespillo, S.J. Zinkle, W.J. Weber, and E. Zarkadoula, "Irradiation-Induced Degradation of Surface Acoustic Wave Devices Fabricated on Bulk AlN," IEEE Trans. Device Mater. Reliab., DOI: 10.1109/TDMR.2022.3212050, (2022).

18. K. Li, Y. Li, H. Tekinalp, V. Kumar, K. Nawaz, **T. Aytug**, and S. Ozcan, "Hydrogen Bond–Induced Aqueous-Phase Surface Modification of Nanocellulose and its Mechanically Strong Composites," J. Matter. Sci., **57**, 8127-8138 (2022).

19. K. Li, G. M. Veith, M. E. Lamm, A. Stevens, T. Lamichhane, W. Guo, S. M. Mahurin, K. Biswas, D. Hun, H. Wang, E. L. Curzio, S. Ozcan, **T. Aytug**, "Hermetically Sealed Porous-Shell Hollow Microspheres Enabled by Monolithic Glass Coatings: Potential for Thermal Insulation Applications," Vacuum, **175,** 110667 (2022).

20. C. Fisher, B. J. Warmack, Y. Yu, L. N. Skolrood, K. Li, P. C. Joshi, T. Saito, and **T. Aytug**, "All-Aerosol-Jet-Printed Highly Sensitive and Selective Polyaniline-Based Ammonia Sensors: A Route Toward Low-Cost, Low-Power Gas Detection," J. Mater. Sci., **56**, 12596–12606 (2021).

21. K. Li, D. Mcgrady, X. Zhao, D. Ker, H. Tekinalp, X. Hed, J. Qu, **T. Aytug,** E. Cakmak, J. Phipps, S. Ireland, V. Kunc, S. Ozcan, "Surface-Modified and Oven-Dried Microfibrillated Cellulose Reinforced Biocomposites: Cellulose Network Enabled High Performance," Carbohydr. Polym., **256**, 117525 (2021).

22. M. Ji, N. R. Taylor, I. Kravchenko, P. Joshi, **T. Aytug**, L. R. Cao, and M. Parans Paranthaman "Demonstration of Large-Size Vertical Ga_2O_3 Schottky Barrier Diodes," IEEE Trans. Power Electron., **36**, 1, 41-44 (2021).

23. N. R. Taylor, M. Ji, L. Pan, P. Kandlakunta, I. Kravchenko, P. Joshi, **T. Aytug**, M. Parans Paranthaman, L. R. Cao, "Large Area Vertical Ga_2O_3 Schottky Diodes for X-ray Detection," Nucl. Instrum. Methods in Phys. Res. A, **1013**, 165664 (2021).

24. K. Li, M. McGuire, A. Lupini, L. Skolrood, F. List, B. Ozpineci, S. Ozcan, and **T. Aytug**, "Copper−Carbon Nanotube Composites Enabled by Electrospinning for Advanced Conductors," ACS Appl. Nano Mater., **3**, 6863-6875 (2020).

25. N. R. Taylor, Y. Yu, M. Ji, **T. Aytug**, S. Mahurin, R. Mayes, S. Cetiner, M. P. Paranthaman, D. Ezell, L. R. Cao, and P. C. Joshi, "Thermal and Radiation Response of 4H–SiC Schottky Diodes with Direct-Write Electrical Contacts," Appl. Phys. Lett., **116**, 252108 (2020).

26. D. Hun, T. Saito, J. Klett, **T. Aytug**, K. Li, B. Li, S. Shrestha, K. Biswas, and S. Ozcan, "Evacuated Spheres for Closed-Cell Vacuum Insulation," 2019 Buildings XIV International Conference, https://www.osti.gov/servlets/purl/1615989.

27. S. Davis, R.C. Duckworth, M.K. Kidder, and **T. Aytug**, "Impact of CSPE Jackets on Accelerated Aging of Harvested Cable Insulations in Support of Remaining Useful Life Assessments," 11^{th} Nuclear Plant Instrumentation, Control and Human-Machine Interface Technologies, NPIC&HMIT, **11**, 1707-1719, (2019).

28. T. Raminosoa and **T. Aytug**, “Impact of Ultra-Conducting Winding on the Power Density and Performance of Non-Heavy Rare Earth Traction Motors,” IEEE International Electric Machines and Drives Conference (IEMDC), 2019.

29. E. Muckley, **T. Aytug**, R. Mayes, A. Lupini, J.-M. Carrillo, M. Goswami, B. Sumpter, and I. Ivanov, “Hierarchical TiO_2:Cu_2O nanostructures for gas/vapor sensing and CO_2 sequestration,” ACS App. Mater. Interfaces **11**, 51, 48466 (2019).

30. P. Joshi, **T. Aytug**, S. Mahurin, R. Mayes, S. Cetiner, H. Wang, I. Kravchenko, Y. Zhang, A. Ievlev, and R. Kisner, “Piezoresistive Characteristics of Silicon Carbide for Integrated Sensor Applications,” 11th Nuclear Plant Instrumentation, Control and Human-Machine Interface Technologies, NPIC & HMIT, **11**, 1416-1424, (2019).

31. K. Li, L. Skolrood, **T. Aytug**, H. Tekinalp, and S. Ozcan, “Ultra-strong and Tough Cellulose Nanofibrils Composites: Mechanism of Synergetic Effect of Hydrogen Bonds and Ionic Interactions,” ACS Sustain. Chem. Eng. **7**, 14341 (2019).

32. **T. Aytug**, M. S. Rager, W. Higgins, F. G. Brown, G. M. Veith, C. M. Rouleau, H. Wang, Z. D. Hood, S. M. Mahurin, R. T. Mayes, P. C. Joshi, and T. Kuruganti, “Vacuum-assisted low-temperature synthesis of reduced graphene oxide thin film electrodes: facile fabrication route to transparent and flexible all-solid-state supercapacitors,” ACS App. Mater. Interfaces **10**, 11008 (2018).

33. J. Lützenkirchen, G.V. Franks, M. Plaschke, R. Zimmermann, F. Heberling, A. Abdelmonem, G. Darbha, D. Schild, A. Filby, P. Eng, J. Catalano, J. Rosenqvist, T. Preocanin, **T. Aytug**, Y. Gan, D. Zhang, and B. Braunschweig, “The surface chemistry of sapphire 0001: A literature review and a study on various factors influencing its isoelectric points,” Adv. Colloid Interface Sci. **251**, 1 (2018).

34. R.C. Duckworth, M.K. Kidder, **T. Aytug**, L.S. Fifield, S.W. Glass, and S. Davis, “Accelerated Thermal Aging of Harvested Hypalon Jacket for Remaining Useful Life Determination and Diagnosis,” 10th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human-Machine Interface Technologies, NPIC & HMIT, 821-830, 2017 (2017).

35. K.J. Leonard, F.A. List, **T. Aytug**, A.A. Gapud, and J.W. Geringer, “Irradiation performance of rare earth and nanoparticle enhanced high temperature superconducting films based on YBCO,” Nuclear Materials and Energy **9**, 251 (2016).

36. G.E. Jellison, **T. Aytug**, A.R. Lupini, M.P. Paranthaman, and J.C. Pooran, “Optical properties of a nanostructured glass-based film using spectroscopic ellipsometry,” Thin Solid Films **617**, 38 (2016).

37. S. Das, G. Gu, P. C. Joshi, B. Yang, **T. Aytug**, C. M. Rouleau, D. B. Geohegan, and Kai Xiao, “Low thermal budget, photonic-cured compact TiO_2 layers for high-efficiency perovskite solar cells,” J. Mater. Chem. A **4**, 9685 (2016).

38. M. Naguib, T. Saito, S. Lai, M. S. Rager, **T. Aytug**, M. P. Paranthaman, M-Q. Zhao, and Y. Gogotsi, “$Ti_3C_2T_x$ (MXene)–polyacrylamide nanocomposite films,” RCS. Adv. **6**, 72069 (2016).

39. M.S. Rager, **T. Aytug**, G.M. Veith, and J.C. Pooran, “Low Thermal Budget Photonic Processing of Highly Conductive Cu Interconnects Based on CuO Nanoinks: Potential for Flexible Printed Electronics,” ACS Appl. Mater. Interfaces **8**, 2441 (2016).

40. B. Yang, O. Dyck, J. Poplawsky, J. Keum, S. Das, A. Puretzky, **T. Aytug**, P. C. Joshi, C. Rouleau, G. Duscher, D. B. Geohegan, and K. Xiao, “Controllable Growth of Perovskite Films by Room-Temperature-Air-Exposure for Efficient Planar Heterojunction Photovoltaic Cells,” Angew. Chem. Int. Ed. **54**, 14862 (2015).

41. Y. Lu, J. Poole, **T. Aytug**, H. Meyer, and S. Ozcan, “Tunable Morphologies of Indium Tin Oxide Nanostructures Using Nanocellulose Templates," RCS Adv. **5**, 103680 (2015).

42. J.T. Simpson, S.R. Hunter, and **T. Aytug**, “Superhydrophobic materials and coatings: a review,” Rep. Prog. Phys. **78**, 086501 (2015).

43. D. Sanjib, Y. Bin, G. Gong, J. C. Pooran, I.N. Ivanov, C.M. Rouleau, Christopher, **T. Aytug**, D.B. Geohegan, and K. Xiao, “High-Performance flexible perovskite solar cells by using a combination of ultrasonic spray-coating and low thermal budget photonic curing,” ACS Photonics **2**, 680 (2015).

44. G.A. Malek, **T. Aytug**, Q.F. Liu, and J.Z. Wu, “Plasmonic three-dimensional transparent conductor based on Al-doped zinc oxide-coated nanostructured glass using atomic layer deposition,” ACS Appl. Mater. Interfaces **7**, 8556 (2015).

45. **T. Aytug**, A.R. Lupini, G.E. Jellison, J.C. Pooran, I.N. Ivanov, L. Tao, P. Weng, R. Menon, R.M. Trejo, E. Lara-Curzio, S.R. Hunter, J.T. Simpson, M.P. Paranthaman, and D.K. Christen, “Monolithic graded-refractive-index glass-based antireflective coatings: broadband/omnidirectional light harvesting and self-cleaning characteristics,” J. Mater. Chem. C **3**, 5440 (2015).

46. A.A. Gapud, N.T. Greenwood, J.A. Alexander, A. Khan, K.J. Leonard, **T. Aytug**, F.A. List III, M. Rupich, and Y. Zhang, “Irradiation of commercial, high-T_c superconducting tape for potential fusion applications: electromagnetic transport properties,” J. Nucl. Mater. **462**, 108 (2015).

47. R. C. Duckworth, G. Polyzos, P. Paranthaman, **T. Aytug**, K. Leonard, and I. Sauers, “Radiation resistance of XLPE nano-dielectrics for advanced reactor application,” Trans. Am. Nuc. Soc. **110**, 937 (2014).

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