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• Career Summary

Research and teaching in advanced materials; strong written and oral communications skills; hands-on experience in thermal plasma and thermal spray technology and materials processing.

• Research and Development Experience:

Teaching Professor: 7/02 - Date Drexel University, Philadelphia, PA

Teaching faculty member, responsible for teaching, administration and service in the Department of Materials Science and Engineering (MSE) at Drexel University. Responsibilities include:

- MSE Dept. representative, College of Engineering freshman/sophomore curriculum task force (2015).
- MSE Dept. *Associate Department Head*, July 2009-date.
- CoE representative, Senate Committee on Academic Affairs (and Undergraduate Sub-Committee) (SCAA) (2012-date).
- Instructor: ENGR 220 sophomore *Fundamentals of Materials* & MATE 580 graduate *Thermal Spray* elective.
- Recitation/Lab. Instructor: ENGR 101-3 freshman *Engineering Design Lab.*; ENGR 220 sophomore *Intro. to Materials*; TDEC 211 and 212 sophomore *Materials I* and *II*; TDEC 231 and 232 sophomore *Materials Laboratory* courses.
- Faculty Coordinator, MATE 491-3 *Senior Design for Materials* course sequence.
- Faculty Coordinator, MATE 100 *Materials for Emerging Technologies* 2-day, 2-credit, freshman elective.
- MSE Dept. *Undergraduate Faculty Advisor*.
- MSE Dept. *Committee on Academic Standing*.
- Chair, MSE Dept. Undergraduate Curriculum and ABET committees. (MSE was the *only* CoE dept. with a clear ABET exit report in 2007 and 2013).
- MSE departmental laboratory facilities coordinator.
- MSE Dept. *Chemical Hygiene Officer (CHO)* – responsible for general laboratory safety, training, safety lectures to RET, REU and ASM Materials Camp students.
- Coordinator of MSE office and laboratory renovations, including relocation of centralized materials characterization facilities to Bossone Research Enterprise Center.
- Member, College of Engineering *Undergraduate Curriculum Committee* (2006-date).
- Member, College of Engineering *Faculty Life Committee* (2006-2008).
- Member, College of Engineering *ABET Committee & Direct Assessment Sub-Committee* (2006-date).
- Associate Director, Drexel Plasma Institute (2003-10).
- Director, Center for the Plasma Processing of Materials (CPPM) (1997-2010).
- Faculty coordinator/liaison for annual ASM International *Materials Camp*[®] summer program.
- Faculty Liaison, Drexel University *Material Advantage*[®] (ASM/TMS/ACerS/AIST) student chapter.

Research Professor: 1-96 to 7-02 Drexel University, Philadelphia, PA

Associate Director and, January 1997-2010, Director of the Center for the Plasma Processing of Materials (CPPM) at Drexel University, carrying out fundamental research and applied R&D on the thermal plasma processing and treatment of materials. Specific responsibilities/accomplishments included:

- Direction of university-based thermal spray research center conducting leading-edge research in thermal spray and plasma processing of materials.

- Overall technical, supervisory, administrative, financial and budgetary responsibility for the Center, with an annual operating budget of ~ \$400k.
- Developed fundamental understandings of process-structure-property relationships in thermal spray coatings developed and used for wear, corrosion and thermal protection.
- Established 20+ kW RF/ICP thermal plasma facility for treating military and chemical waste.
- Led industry and US Department of Energy (DoE) funded R&D on thermal plasma chemical synthesis, treatment of materials and polymeric waste.
- Wrote research proposals and quotations to industry, State (Ben Franklin Technology Partners) and government agencies (NSF, DoE), incl. SBIR and STTR partnering with small businesses.
- Appointed and supervised technical staff, visiting researchers, graduate, undergraduate and work study students.

Research Assistant Professor: 8-92 to 1-96 Drexel University, Philadelphia PA

Associate Director - Center for the Plasma Processing of Materials (CPPM)

- PI on NSF-funded program on *Residual Stress in Thermally Sprayed Coatings*.
- Co-PI on NSF ERC program *Lightweight Plasma Sprayed Coatings for Structural Applications*.
- Led 2-year industry-funded R&D program on RF thermal plasma treatment of military waste.
- Supervised technical staff and students working on NSF and industry-funded research.
- Wrote research proposals to industry, state and government agencies (NSF).
- Established CPPM's *Technical Extension Services* program for small and medium-sized PA companies, and associated tracking database.
- Co-authored several SBIR Phase I and II proposals with, and for, CPPM industry partners.
- Established and led CPPM marketing and outreach program, including press releases, brochure, web pages, and mailing campaign.

Research Associate: 9-89 to 7-92 Drexel University, Philadelphia, PA

Comparative study of the characteristics of coatings produced by various high velocity oxy-fuel (HVOF) combustion spray systems:

- Developed experimental plans and matrices.
- Sprayed coatings and conducted microstructural characterization and analysis for process comparisons.
- Documented and reported results to CPPM project sponsors.

Transferred-arc plasma melting of reactive metals:

- Developed a 100 kW DC transferred-arc plasma melting facility and associated instrumentation.
- Specified, installed and configured a computerized data acquisition for plasma system parameter monitoring.
- Conducted plasma melting trials with Ti and Ti-6Al-4V for process characterization.

Postdoctoral Fellow: 9-85 to 8-89 University of Minnesota, Minneapolis, MN

Research engineer developing a transferred-arc smelting process for ferrochromium and plasma reactor for the in-flight treatment of particulate materials.

- Led, coordinated and organized a team of 7 researchers investigating the recovery of ferrochromium from low grade US chromite concentrates by carbothermic smelting in a 0.5 MW DC, hollow graphite cathode, transferred-arc plasma furnace.
- Developed and installed conducting hearth (anode) in DC arc smelting furnace.
- Optimized 1 MW DC power supply for use with various plasma furnace and reactor systems.
- Maintained and operated various DC plasma power supplies and associated control systems.
- Installed, tested and operated ~1 MW magnetically rotated arc plasma reactor for in-flight treatment of particulate minerals, including production of basaltic lunar simulant.
- Supervised technical and support staff.

Consultant:

1980-Date

Misc. US and UK Companies

- Corrpro, Westchester, PA: Developed corrosion-resistant metallic coating protocol.
- S. D. Warren Services Company, Westbrook, ME: Residual stress in coatings.
- High Velocity Technologies, Inc., Lebanon, NH: HVOF thermal spray process technology.
- Connecticut Resource Recovery Agency (CRRA), Hartford, CT: Reviewed candidate plasma technologies for waste destruction.
- UTRON, Inc., Manassas, VA: Proprietary pulsed thermal spray processes.
- Davy McKee R & D, Stockton-on-Tees, UK: Supervised and coordinated team of 7 engineers during feasibility study developing a high power multiple arc industrial DC plasma torch and melting furnace.
- BP Research Centre, Sunbury-on-Thames, UK: Designed, constructed and installed a 100 kW experimental multiple torch plasma system - power supply, furnace, cooling system and control system.
- Cambridge University, Metallurgy Department, Cambridge, UK: Designed and constructed a prototype in-flight multiple arc plasma reactor and power supply.
- Southern Industrial Products, Milton Keynes, UK: Designed, constructed and developed a 40 kW plasma cutting system.
- Imperial Metals Industries (IMI), Birmingham, UK: Problem-solving on industrial plasma welding system.
- Johnson-Matthey Research Centre, Sonning Common, UK: Designed, developed and tested a prototype industrial multiple torch plasma furnace and associated 100 kW DC power supply.

• **Academic Record:**

- Ph.D. - Electronic & Electrical Engineering Loughborough University, UK, 1985
Thesis: *Multiple Arc Discharges*
- M.Sc. - Electroheat and Industrial Process Heating Loughborough University, UK, 1978
Thesis: *An Investigation of a Multiple Arc Discharge for the Generation of a Large Volume of Ionized Gas*
- B.Sc. (Hons) - Electronic & Electrical Engineering Loughborough University, UK, 1977
Project: *Noise Reduction in a Plasma Cutting Torch*

Selected Graduate (M.Sc.) Coursework

Electric Resistance Heating	Ovens and Furnaces	Induction Heating
Dielectric Heating	Temperature Measurement & Control	
Infrared (IR) Heating	High-Intensity Sources	Materials Engineering

• **Selected Grant Submissions & Research Funding Received:**

Submission of proposals totaling ~\$10.8 million; receipt of ~\$3 million in research funding 1997-2010, including ~\$2 million from federal sources and ~\$970k from industry. Highlights included:

- Residual Stress in Thermal Spray Coatings (1995, NSF-DMII).
- Synergistic Synthesis and Forming of Advanced MoSi₂/SiC Composites (1995, NSF-DMII SBIR Phase I and II with Exotherm Corp.)
- Plasma Energy Recycle and Conversion of Polymeric (MSW) Waste (1996, DoE).
- Thermal Spray of Polymer/Ceramic Nanocomposites (1997, NSF-DMII).
- Development of Thermally Sprayed FGM Erosion/Oxidation Resistant Ctgs. for Polymeric Substrates (2000, NASA-Glenn).
- Feasibility Study on High Yield Thermal Plasma Synthesis of Carbon Nanotubes and Other Nano-Crystalline Forms of Carbon (2002, NSF-NNI).
- Collaborative Research on Thermal Spray of Multi-Scale Polymer/Ceramic Composite Coatings (2002, NSF-DMII).

• **Patents, Patent Disclosures and Applications:**

Jun. 2009 *Nanodiamond Manufacture and Process for Making Thereof*, US Patent Application 12/478,051.
Dec. 2002 *Method of Applying Corrosion, Oxidation and/or Wear-Resistant Coatings*, US Patent No. 6,497,922,

- (with M. W. Barsoum).
- Sept. 2002 *Thermal Plasma Process for Recovering Monomers and High Value Carbons from Polymeric Materials*, US Patent No. 6,444,864, September 3, 2002. (with E. D. Grossmann and R. Guddeti).
- May 2001 *Corrosion, Oxidation and/or Wear-Resistant Coatings*, US Patent No. 6,231,969 B1 (with M. W. Barsoum).
- May 1997 *A New Thermally Sprayed Corrosion-Resistant Coating* - Invention Disclosure.
- Apr. 1997 *Inert Gas Shroud for Air Plasma Spray Process* - Invention Disclosure.

• **Professional Awards, Honors and Service Activities:**

- Feb, 2018 Winner, College of Engineering, Engineers Week 2018, *Faculty Jeopardy* Contest
- Jan. 2018 College of Engineering *Outstanding Service Award*, Drexel University.
- June 2015 Dept. of Materials Science and Engineering *Outstanding Service Award*, Drexel University.
- May 2015 Philadelphia *Liberty Bell* Chapter of ASM Int'l., *2015 Meritorious Service Award*.
- Jan. 2015 Chair, ASM International. *Historical Landmarks Committee* (2015-date).
- Nov. 2014 25-year *Service Recognition Award*, Drexel University.
- Oct. 2012 Philadelphia *Liberty Bell* Chapter of ASM International, *2012 Eisenman Award & Lecture*.
- June 2011 Dept. of Materials Science and Engineering *Outstanding Service Award*, Drexel University.
- Mar. 2011 Member, ASM International. *Web Committee* (2010-15).
- June 2011 Member ASM *College & University Committee* (2011-15, Inaugural Chair 2011-14).
- Nov. 2010 20-year *Service Recognition Award*, Drexel University.
- June 2010 Member, Philadelphia *Liberty Bell* Chapter of ASM International *Awards Committee* (2010-date).
- Mar. 2010 Philadelphia *Liberty Bell* Chapter of ASM International, *2010 Albert Sauveur Award & Lecture*.
- Oct. 2009-12 Trustee, ASM International.
- May 2009 Fellow of *Alpha Sigma Mu* international professional honor society for Materials Science & Eng.
- Apr. 2009 Recipient, ASM TSS *President's Award*.
- June 2008 Drexel University, *Harold M. Myers Award for Outstanding Service to the University*.
- May 2007 Philadelphia *Liberty Bell* Chapter of ASM, *Delaware Valley Materials Person of the Year*.
- Feb. 2007 Drexel University, College of Engineering *Outstanding Auxiliary Faculty* award.
- Oct. 2006-08 Immediate Past-President, ASM International's Thermal Spray Society (TSS).
- Oct. 2006-08 Chair, ASM International's *Thermal Spray Society* Nominating Committee.
- May 2006 General Co-Chair, International Thermal Spray Conf. (ITSC 2006), Seattle, WA.
- Jan. 2006 Member, ASM Int'l. *Historical Landmarks Award Committee* (2006-09, 2014-17).
- Nov. 2005 15-year *Service Recognition Award*, Drexel University.
- May 2005 President's Award, Philadelphia *Liberty Bell* Chapter of ASM International.
- May 2005 General Co-Chair, International Thermal Spray Conf. (ITSC 2005), Basel, Switzerland.
- Sep. 2004-06 President, ASM International *Thermal Spray Society* (TSS).
- May 2004 General Co-Chair, International Thermal Spray Conf. (ITSC 2004), Osaka, Japan.
- Oct. 2003 Elected, Fellow of ASM International (FASM).
- May 2003 Best Poster Award, International Thermal Spray Conference (ITSC 2003), Orlando, FL.
- May 2003 Best Paper Award-Honorable Mention, ITSC 2003, Orlando, FL.
- Apr. 2003 Dept. of Materials Science and Engineering *Outstanding Service Award*, Drexel University
- Apr. 2003 *Best Poster Award*, Drexel University 5th Annual Research Day.
- Oct. 2002 Elected Vice-President, ASM International *Thermal Spray Society*.
- Oct. 2002 *Chair*, ASM International Thermal Spray Society Program Committee.
- May 2002 Best Poster Award, Drexel University/MCPHU Research Day *Development of Thermally Sprayed Functionally Graded Coatings for Polymeric Substrates* (with M. Ivosevic, S. Kalidindi, G. R. Palmese).
- May 2001 Best Poster Award, Drexel University Research Day *Thermal Spraying of Amorphous Matrix Polymer/Silica Nanocomposites* (with S. Dimovski and T. E. Twardowski).
- Nov. 2000 10-year *Service Recognition Award*, Drexel University.
- Oct. 2000 Materials Engineering Institute *Instructor of Merit Award*, ASM International.
- Oct. 2000 Appointed, Secretary/Treasurer of ASM International Thermal Spray Society.
- Jan. 1999 Appointed, Member of Editorial Board of *Plasma Chemistry and Plasma Processing*.
- Nov. 1998 Elected, Member of Board of Directors, ASM International *Thermal Spray Society*.

Oct. 1997-02 Chair, ASM International *Thermal Spray Society* Training Committee.

Member: Institution of Engineering and Technology (IET, formerly the IEE) (1987-date).
Chartered Engineer (UK) (1987-date).
ASM International® (1989-date), IEEE (1992-date), ASM Thermal Spray Society (1994-date).
ASM TSS Information Development & Delivery Committee (1996, 1999-2010).
ASM TSS Training Committee (1997-date).
ASM Nominating Committee (1998).
Technical Program Committee for annual ITSC conference (2000-09).

Reviewer: National Science Foundation (MRI, SBIR, STTR and Nano Programs); U.S. Department of Energy (SBIR/STTR); DoE/DoD/EPA SERDP Program; U.S. Civilian Research & Development Foundation (CRDF); National & International Thermal Spray Conference Best Paper Awards; Plasma Chemistry and Plasma Processing; Journal of Thermal Spray Technology; International Journal of Powder Metallurgy; Surface and Coatings Technology; ASME; ASME Journal of Heat Transfer; Metallurgical and Materials Trans.; Plasma Sources, Science & Technology; International Gas Turbine Institute; International Symposium on Heat and Mass Transfer under Plasma Conditions; Wear of Materials.

Chair: More than 20 sessions at National & International thermal spray conferences.

Organizer: ~5 dedicated technical sessions on the thermal spraying of polymers at ITSC conferences, 1999-2007.

Champion: *Thermal Spray Safety* technical session at ITSC-2000 conference, Montréal, Canada, 2000.

Advising: Undergraduate Freshman Design teams (1998/99; 1999/00, 2002/03, 2005/06); ~10 Senior Design projects; ~25 Drexel University Freshman Engineering Students (Fall 1999).

Awards: SERC Grant (UK) for own M.Sc. and Ph.D. studies.

• Teaching Experience:

- Primary Instructor: ENGR 220 (2009-date).
- Primary Instructor: MATE 580 *Thermal Spray* course, (2003-date).
- Coordinating Instructor: MATE 491-3 *Senior Design* capstone course sequence, (2006-date).
- Recitation Instructor: ENGR 220 (2007-date).
- Recitation Instructor: ENGR 102-3 (2006-date).
- Recitation Instructor: Materials I (TDEC 211), Drexel University (Fall & Spring since 2001-02).
- Recitation Instructor: Materials II (TDEC 212), Drexel University (Winter & Summer 2001-04).
- Coordinator: *Materials I* Lab. Class (TDEC 231), Drexel University (Fall & Spring since 2001-02).
- Coordinator: *Materials II* Lab. Class (TDEC 232), Drexel University (Winter & Summer 2002-04).
- Coordinator: MATE 100 *Materials for Emerging Technologies* 2-credit, 2-day course (Fall 2002-date).
- Recitation Instructor: University Seminar (TDEC 100), Drexel University (Fall 1999).
- Freshman Design Advisor, Drexel University - 1999, 2003, 2004, 2006-08.
- Instructor for ASM International® 3-day *Thermal Spray Technology* course: Rosemont, IL, (1998); Cincinnati, OH (1999); Montreal, Canada (2000); Singapore (2001); Essen (2002); Columbus, OH (2002); Orlando, FL (2003); Osaka, Japan (2004); Basel, Switzerland (2005), Seattle (2006); Beijing (2007); Maastricht (2008).
- Supervisor: Undergraduate laboratory classes in *Electrical Machines*, Loughborough University (UK).
- Supervisor: Graduate laboratory classes for *Electroheat & Industrial Process Heating* M.Sc. course.
- Supervisor of laboratory and project classes for *Electricity Council Industrial Applications* short course at Loughborough University (UK).
- Tutorial classes during M.Sc. short-courses on Resistance Heating, Ovens & Furnaces, Induction Heating, Dielectric Heating, Temperature Measurement & Control, Infrared Heating and High-Intensity Sources.

• Community Activities and Hobbies:

- Music, High-End Audio, Auto Racing, Literature, Digital Photography, Computers, Writing & Proof Reading.
- Former writer of Music Reviews for *The Triangle* - Drexel University student newspaper.
- Founding member, Loughborough University (UK) *Real Ale Society*.
- DJ on Loughborough University (UK) campus radio station in late 1970s.
- Senior student, Loughborough University graduate residence.

- Community service, *Ashfield House* retirement home in Raunds (UK) 1 afternoon per week.
- Combined Cadet Force, Royal Air Force (RAF) - Proficiency Test, passed with Distinction (1973).

• **List of Publications:**

Available on request.

• **References:**

Available on request.