CURRICULUM VITAE

Sudhakar Vadiraja, Ph.D., P.E.
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PROFESSIONAL EDUCATION

- Ph.D. (Materials Engineering): Indian Institute of Science, Bangalore, 1997; *Dissertation:* Influence of Martensite Content on Fatigue Crack Growth Behavior and Fracture Toughness of High Martensite Dual Phase Steel.
- Master's degree in Materials & Metallurgical Engineering: Indian Institute of Technology, Kanpur, 1991; *Thesis:* Correlation of Fracture Toughness with Microstructure and other Mechanical Properties in Near-Eutectoid Steel.
- Bachelor's degree in Materials & Metallurgical Engineering: National Institute of Technology, Surathkal, 1981; *Project work:* Stress Corrosion Cracking of Mg-Al Alloys in Marine Environment.

PROFESSIONAL REGISTRATION

- Registered P.E. in Montana: License # 20027 (29 Oct. 2010 - present)

COURSES TAUGHT

- Biomaterials
- Failure Analysis & Design Life
- Mechanical Behavior
- Materials Science
- Materials Structures & Properties
- Materials Processing & Performance
- Corrosion
- Materials Selection & Design
- Composite Materials
- Materials Characterization
- Electricity & Magnetism (Physics)
- Microstructural Interpretation Lab
- Materials & Physical Metallurgy Lab
- Failure Analysis Lab

AWARDS/RECOGNITION

- 2022 and 2016 Faculty Merit Award for outstanding Teaching and Research at Montana Technological University, USA.
- 2002-2007 Achieved an average score of 9.0/10.0 for Teaching at University of the Americas-Puebla for the Five Academic years.
- 1999-2000 Achieved an average score of 4.5/5.0 for Teaching at Western Michigan University, USA.
- 2004-2007 National Research Scholarship Award (#30955) of Mexico Research System.
- 2001 Outstanding Faculty Research Award at Central Michigan University, USA.
- 1992-94 Indian Government Scholarship for Research (Ph.D.).
- 1989-91 National GATE Scholarship for Postgraduate studies (M.Tech.).

PROFESSIONAL EXPERIENCE

Academics

- Montana Technological University, Butte, MT (Jan. 2008 - Present)
  Tenured Professor – Metallurgical & Materials Engineering Department.
  Duties: Advising, Teaching undergraduate and graduate level courses. Actively participated in the Curriculum development of undergraduate and graduate program of the department. Developed and introduced new courses- Biomaterials, Failure Analysis & Design Life, Materials Selection & Design, and Mechanical Behavior of Materials.
- University of the Americas -Puebla, Mexico (July 2002 - Dec. 2007)
  Professor Titular- Mechanical Engineering Department
  Duties: Responsible for teaching undergraduate materials/mechanical engineering courses. Responsible for planning and designing the mechanical and metallographic tests/experiments for Materials Science-I and Materials Science-II labs. Responsible for developing and executing a university-sponsored research every academic year. Advised undergraduate students.
- Central Michigan University, Mount Pleasant, Michigan-48859 (Aug. 2000 - May 2001)
  Assistant Professor – Ind. & Eng. Tech. Department, College of Science and Technology
  Duties: Teaching and Research, Student Advising and related activities.
- Western Michigan University, Kalamazoo, Michigan-49008 (Sept.1999 - Aug. 2000)
  Assistant Professor-Department of Materials Science & Engineering, CMD, College of Applied Sciences and Engineering.
  Duties: Teaching and Research, Student Advising and related activities.
- Indian Institute of Science, Bangalore: (Jan. 01, 1997 - Aug. 31, 1999): Postdoctoral Research Associate.
  Areas of research: Fatigue behavior of (i) Metal Injection Molded (MIM) components (ii) Cold Worked High Strength Steel for Railway Applications (iii) Failure Analysis of Aircraft Materials, Automobile, Microelectronic materials, and other Engineering Components.
- Master's student (1989-1991)
- Doctoral student (1992-1994)

Industries

- Hindustan Aeronautics Limited, Bangalore (Nov. 1994 - Nov. 1996) : R&D Manager
  Areas of research: Responsible for developing technical data on Fatigue Crack Growth and Fracture Toughness Studies for Newer Aircraft Materials. Performed Failure Analysis of Aircraft Components/Materials as a part of quality control, also established Creep, Structure-Property Optimization data for Aerospace/Aircraft Materials.
- Cosmic Industrial Laboratories Ltd., Bangalore (July 1987 - Feb.1989): R&D Metallurgist
  Duties: Responsible for performing Failure Analysis of Industrial Components/Materials.
  I performed the task of assessing the quality of engineering products/materials by Mechanical Properties' Evaluation and Microscopic Studies on Varieties of Industrial Components/Materials.
- IDL Chemicals Ltd., Bangalore & Hyderabad (Oct. 1984 - April 1986): R&D Metallurgist
  Duties: Responsible for the Development and Production of Clad and Formed Plates (SS/MS, Al/MS) using High Strain Rate Energy (Explosive Welding), Characterization of Composite Plates for Mechanical Properties and Microstructure features. Successfully welded and characterized (for Microstructure and mechanical properties) Al-Steel electrical transition joints.
- Grindwell Norton Ltd., Bangalore (June 1982 - Oct. 1984): R&D Metallurgist
  Duties: Successfully developed and established Silicon Carbide material for Applications in Melting Steel and Cast Iron as a deoxidizer as well as a source of silicon and carbon. I was responsible for performing Destructive and Non-Destructive Tests, Mechanical properties and Microstructure evaluation for Steel and Cast Iron Products.
- Kirloskar Oil Engines Limited, Pune (July 1981 - May 1982): Graduate Trainee Engineer *Duties*: Responsible for Heat Treatment and Metallurgical Quality Control activities. Successfully introduced Induction Hardened S.G. Iron Crankshafts and evaluated their performance with Low Alloy Steel crankshafts.

RESEARCH PUBLICATIONS

(a) Selected Refereed Journal Publications

- Stephen A. C. Hanson and Sudhakar Vadiraja, "Mechanical and Microstructural Behavior of Tempered CPM 3V High-Density Sintered Tool Steel", Crystals (Special Issue-Advances in High Strength Steels), 2022, 12(11), 1670; https://doi.org/10.3390/cryst12111670
- Penn Rawn and Sudhakar Vadiraja, "Effect of Energy Density and Build Orientation on Microstructure of Additive Manufactured Stainless Steel", European Journal of Materials Science and Engineering, 4(3), 2019, 103-113.
- K. Bari, A. Rolfe, A. Christofi, C. Mazzuca, and K.V. Sudhakar, Forensic Investigation of a Failed Connecting Rod from a Motorcycle Engine, Case Studies in Engineering Failure Analysis, 9, 2017, 9-16.
- Stephen Broddy and K.V. Sudhakar, "Corrosion Inhibition: Investigation of Lanolin Coating on the Corrosion Characteristics of Low Carbon Steel in Simulated Sea Water", Protection of Metals and Physical Chemistry of Surfaces (Springer), 53(6), 2017, 1125-1130.
- K.V. Sudhakar and Ethan Wood, "Superplastic Titanium alloy: Evaluation of Mechanical Properties and Fracture behavior", Journal of Materials (Hindawi Publishing Corporation), http://dx.doi.org/10.1155/2016/2309232, Article ID 2309232, 2016.
- Jyhwen Wang, Huanlin Zhu, K.V. Sudhakar, Angie Hill Price, "Influence of equal-channel angular extrusion on impact toughness of aluminum and brass at room and low temperatures", International Journal of Mechanical and Materials Engineering (*Springer Publications*), 9(1), 2014, 1-10.
- K.V. Sudhakar, J.C. Cisneros, Hector Cervantes, and Cosme Gomez Pineda, "Machining Characteristics and Fracture Morphologies in a Copper-Beryllium (Cu-2Be) Alloy", ASM International Journal of Materials Engineering and Performance, Feb. 15(1), 2006, 117-121.
- K.V. Sudhakar and Joel Cruz Paredes, "Failure Mechanisms in Motor Bearings", Engineering Failure Analysis *(Elsevier Science Publications)*, 12(1), Feb. 2005, 35-42.
- K. V. Sudhakar, "Investigation of Fracture in a K12-Tongue Component", Engineering Failure Analysis (*Elsevier Science Publications*), 9(1), Jan. 2002, 77-82.
- K.V. Sudhakar, "Fatigue Behavior of a High Density Powder Metallurgy Steel," International Journal of Fatigue (*Elsevier Science Publications*), 22(9), Oct. 2000, 729-734.

(b) Selected Refereed Conference Presentations

- Stephen Hanson, Sudhakar Vadiraja, Nathan Huft, Peter Lucon, "Evaluation of SLM Parameters for Producing Elementally Homogeneous Printed Products Using Novel Dry Metal Alloy (DMA) Powder Feedstock", TMS Annual Meeting & Exhibition, San Diego, CA, March 19-23 (2023).
- Maureen Chorney, Jerome Downey, K.V. Sudhakar, "Development of an Experimentally Derived Model for Molybdenum Carbide (Mo_2C) Synthesis in a Fluidized-Bed Reactor", TMS Annual Meeting & Exhibition, San Diego, CA, March 19-23 (2023).
- Jannette Chorney, Jerome Downey, K.V. Sudhakar, Morgan Ashbaugh, Grant Wallace, "Thermal Analysis of Potential High Entropy Alloy Binder Alternatives for Tungsten Carbide", TMS Annual Meeting & Exhibition, Anaheim, CA, Feb 27-March 3 (2022).
- K.V. Sudhakar, Penn Rawn, Bryce Abstetar, Ronda Coguill, Bruce Madigan, "Additive manufacturing of stainless steel: processing, microstructure, and material properties", MS&T 2016, Salt Lake City, Utah, October 23-26, (2016).
- K.V. Sudhakar, "Evaluation of corrosion problem in heating elements", 143rd SME Annual Meeting and Exhibit Salt Palace, Salt Lake City, Utah, February 23-26, (2014).
- K.V. Sudhakar, Jaime Maldonado Escalante, "Characterization of Natural Fiber Reinforced Polymer Composite for Automotive Applications", SAMPE (Society for the Advancement of Material and Process Engineering) Fall Technical Conference Proceedings, Oct. 11-14, Salt Lake City (2010).

GRADUATE RESEARCH

- Thesis Topic: "Optimization of Porosity in Cold Spray Produced Copper and Zinc Coatings", Thesis defense: April 21, 2023, Committee: K.V. Sudhakar (Chair), Nathan Huft, Peter Lucon, Rick LaDouceur, Student: Cameron Hughes.
- Thesis Topic: "Microstructural and Mechanical Analysis of Cobalt-Free High Entropy Alloys", Thesis defense: April 20, 2023, Committee: Jerry Downey (Chair), Sudhakar Vadiraja, Tom Cay, Jannette Chorney, Student: Morgan Ashbaugh.
- Thesis Topic: "The Tempering Response of CPM-3V Tool Steel Investigated through Tensile Testing, Microstructural observations, and Crystallographic and Elemental Analysis", Thesis defense: April 21, 2022, Committee: Sudhakar Vadiraja (Chair), Nathan Huft, Peter Lucon, Student: Stephen Hanson.
- Thesis Topic: "Topology Optimization with Constant Life Fatigue Constraints", Thesis defense: April 14, 2022, Committee: Peter Lucon (Chair), Nathan Huft, Sudhakar Vadiraja, Student: Ingvar Kalseng-Hansen.
- Thesis Topic: "Processing of Elementally Mixed Powders", Thesis defense: April 11, 2022, Committee: Nathan Huft (Chair), Sudhakar Vadiraja, Peter Lucon, Rick LaDouceur, Student: Daniel Jacintho.
- Dissertation Topic: "Continued development of ceramic-reinforced ultra-high molecular weight polyethylene (UHMWPE) ballistic plates", Thesis defense: July 28, 2021, Committee: Jerry Downey (Chair), K.V. Sudhakar, Peter Lucon, Dario Prieto, Stephen W. Sofie, Student: Trenin Bayless.
- Thesis Topic: Evaluation of Resonant Acoustic Mixing for use in Elemental Mixing, Thesis defense: Dec. 01, 2020, Committee: Peter Lucon (Chair), K.V. Sudhakar, Jack Skinner, Scott Coguill, Student: Riley McNabb.
- Dissertation Topic: "Effect of Global Energy Density on Dynamic Strain Hardening of Selective Laser Melted AlSi10Mg", Defense: Nov. 04, 2020, Committee: Brahmananda Pramanik (Chair), K.V. Sudhakar, Peter Lucon, Laurie Battle, Erik Grumstruck, Student: Salah Uddin.
- Thesis Topic: "Particle Tracking of a Simulated Melt Pool of Selective Laser Melting (SLM)", October 30, 2020, Committee: Peter Lucon (Chair), K.V. Sudhakar, Jack Skinner, Scott Coguill, Student: Prakash Gautam.
- Dissertation Topic: "Synthesis of Metal-Carbides via Adsorption of Anions onto an Activated Carbon Matrix", Defense: July 23, 2020, Committee: Jerry Downey (Chair), K.V. Sudhakar, Paul Gannon, Dario Prieto, Larry Twidwell, Student: Grant Wallace.
- Thesis Topic: "Microstructural analysis of 316L Stainless Steel produced by plasma Arc Welding Additive Manufacturing", Thesis defense: Nov. 21, 2019, Committee: K.V. Sudhakar (Chair), Brahmananda Pramanik, Bruce Madigan, Lee Richards, Student: Ryan Foley.
- Thesis Topic: "Dynamic Mechanical Response of Additively Manufactured 316L and AlSi10Mg metal alloys", Thesis defense: April 23, 2019, Committee: Brahmananda Pramanik (Chair), K.V. Sudhakar, Todd Hoffman, Steve Tarrant, Student: Kris Kuelper.
- Dissertation Topic: "Investigation of Multiple Torch PAW-Based Additive Manufacturing", Defense: April 11, 2019, Committee: Bruce Madigan (Chair), K.V. Sudhakar, Dario Prieto, Josh Wold, Paul Gannon, Student: Nathan Huft.
- Thesis Topic: "Increasing Strength in Para-Aramid Fibers using Carbon Nanotubes in Solution with Toluene and Toluene Diisocyanate", Thesis defense: Nov. 28, 2018, Committee: Dario Prieto (Chair), Jack Skinner, K.V. Sudhakar, Ronald White, Student: Shelby Mallin.
- Thesis Topic: "Material Properties of Laser Powder Bed Fusion Processed 316L Stainless Steel", Thesis defense: July 20, 2018, *Committee*: K.V. Sudhakar (Chair), Bruce Madigan, Ronda Coguill, Ronald White, *Student*: Steven Keckler.
- Thesis Topic: "Evaluation of metallurgical and mechanical properties of AlSi10Mg produced by selective laser melting", Thesis defense: April 19, 2018, *Committee*: K.V. Sudhakar (Chair), Bruce Madigan, Brahma Pramanik, *Student*: Luke Suttey.

- Thesis Topic: "Characterization of process induced defects in laser powder bed fusion processed AlSi10Mg alloy", Thesis defense: April 18, 2018, *Committee*: K.V. Sudhakar (Chair), Bruce Madigan, Brahma Pramanik, *Student*: Edward J. Stugelmayer.
- Thesis Topic: "3D-printing of 316L stainless steel and its influence on mechanical properties and microstructure", Thesis defense: Oct. 18, 2017, *Committee*: K.V. Sudhakar (Chair), Bruce Madigan, Ronda Coguill, *Student*: Penn Rawn.
- Thesis Topic: "Processing-Microstructure-Mechanical property correlation in Aluminum alloy produced by additive manufacturing", Thesis defense: Dec. 03, 2016, *Committee*: K.V. Sudhakar (Chair), Bruce Madigan, Alan Meier, *Student*: Bryce Abstetar.
- Thesis Topic: "Vacuum brazing of diamond to tungsten carbide", Thesis defense: April 29, 2016, *Committee*: Alan Meier (Chair), K.V. Sudhakar, Gagan Saini, *Student*: Zhiyong Yin.
- Thesis Topic: "Thermo-mechanical processing and mechanical behavior of Ti-15-3-3-3, SP-700 and Beta-C titanium alloys for biomedical applications", Thesis defense: May 1, 2015, *Committee*: K.V. Sudhakar (Chair), Alan Meier, Jack Skinner, *Student*: Ethan Wood.
- Thesis Topic: "Investigation in the use of plasma arc welding and alternative feedstock delivery method in additive manufacture", Thesis defense: April 21, 2014, *Committee*: Bruce Madigan (Chair), Jahan Bayat, K.V. Sudhakar. *Student*: Abdullah F. Alhuzaim.
- Thesis Topic: "Heat transfer from GTA welding arcs, Thesis defense: July 27, 2012, *Committee*: Bruce Madigan (Chair), Matthew Egloff, K.V. Sudhakar, Student: Nathan J. Huft.
- Thesis Topic: "Investigation of plasma arc welding as a method to directly manufacture Ti-6Al-4V components", Thesis defense: July 24, 2012, *Committee*: Bruce Madigan (Chair), Matthew Egloff, K.V. Sudhakar, *Student*: Joe N. Stavinoha.

UNDERGRADUATE RESEARCH

- Ben Suslavich, Title: Improving the Biocompatibility of the β phase Ti Alloy SP-700 in Vitro using Alkali Solution Treatment, 2017
- Stephen Broddy, Title: Corrosion Inhibition: The Investigation of Lanolin Coating on the Corrosion Characteristics of 1018 Carbon Steel in Simulated Sea Water, Aug. 2015-April 2016.
- Luke Suttey, Title: Knee joint prosthesis- Mechanical Properties Evaluation of a titanium-based biomedical alloy, Jan. 2015-April 2015.
- Keeley & Kallen, Title: Surface Characterization of Beta-Titanium Alloys for Biomedical Applications, Jan 2012-Dec 2012.

PROFESSIONAL MEMBERSHIP/RECOGNITION

- Professional Member (#707643) of ASM (American Society for Materials).
- Professional Member (#474620) of TMS (The Minerals, Metals & Materials Society).
- Professional Member (#187419) of AIST (Association for Iron & Steel Technology).
- Professional Member (#1217771) of ACerS (American Ceramic Society).
- Life Member (# L0853) of Materials Research Society of India (MRSI) Limited.
- Life Member (# 24632) of Indian Institute of Metals (IIM).