

Exponent®
Engineering & Scientific Consulting

Joshua Green, Ph.D.

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Professional Profile

Dr. Green has led numerous projects spanning failure analysis, additive manufacturing, structural and multifunctional materials, functionally graded materials, musculoskeletal biomechanics, and fracture mechanics in polymer-matrix composites providing expert analysis and consulting for Fortune 500 manufacturers, law firms, and national laboratories.

His work encompasses failure analysis, advanced manufacturing, composition optimization, polymers, composites, and metals with expertise in the relationship between material composition, structure, properties, processing, and performance.

Industries & Problem Types

Dr. Green has served clients in oil and gas, aerospace, and automotive industries, addressing challenges including material and manufacturing process qualification, polymer blend and composite formulation optimization, seal performance and longevity in high-temperature and high-pressure applications, and component failure investigation in vehicular accidents and industrial equipment.

Methodology & Technical Differentiators

Dr. Green's consulting approach integrates mechanical testing, materials characterization, laboratory analysis, and field inspections to deliver rigorous, defensible, and evidence-based conclusions. His ability to bridge fundamental materials science with applied engineering challenges allows him to address complex, multidisciplinary problems with both technical depth and practical clarity.

Prior Experience & Academic Background

Prior to joining Exponent, Dr. Green served as a Research Associate Professor at The University of Texas at El Paso, where he pioneered advancements in additive manufacturing, process-planning software, functionally graded materials, multifunctional materials, polymer blends, and musculoskeletal biomechanics. During this time, he secured more than $1M in research grants and cultivated strategic partnerships with corporate sponsors and national laboratories. Dr. Green also served as a Faculty Fellow at both the Air Force Research Laboratory and the Naval Research Laboratory, where he characterized functionally graded materials using advanced techniques including microcomputed tomography, synchrotron measurement of crystallinity in multiphase polymers, and digital image correlation. He earned his Ph.D. in Materials Science and Engineering and his B.S. in Mechanical Engineering from The University of Texas at El Paso and LeTourneau University, respectively.

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Thought Leadership & Community

Dr. Green is an active contributor to the American Society for Composites (ASC), Society of Petroleum Engineers (SPE), and American Society of Mechanical Engineers (ASME). He has published six peer-reviewed articles on functionally graded materials, additive manufacturing, musculoskeletal biomechanics, and composites, and regularly presents at leading technical conferences including the Annual International Solid Freeform Fabrication Symposium, the ASC Annual Technical Conference, the International Petroleum Technology Conference and Exhibition, and the American Society of Biomechanics Conference. He has also served as an instructor across multiple engineering disciplines at The University of Texas at El Paso, teaching courses in Fluid Mechanics, Thermodynamics, Thermal-Fluid Sciences, Mechanics of Materials, Statics, and Senior Professional Orientation.

Academic Credentials & Professional Honors

Ph.D., Materials Sci & Engineering, University of Texas, El Paso, 2018

B.S., Mechanical Engineering, LeTourneau University, 2009

Academic Appointments

Adjunct Professor, Engineering Education and Leadership, The University of Texas at El Paso, 2026

Adjunct Professor, Mechanical Engineering, The University of Texas at El Paso, 2019-2024 and 2026

Research Associate Professor, The University of Texas at El Paso, El Paso, TX, 2018-2026

Prior Experience

Research Associate Professor, The University of Texas at El Paso, El Paso, TX, 2012-2026

Faculty Fellow, Air Force Research Laboratory, Wright-Patterson Air Force Base, 2023

Faculty Fellow, Air Force Research Laboratory, Wright-Patterson Air Force Base, 2022

Faculty Fellow, Naval Research Laboratory, Washington D. C., 2022

Faculty Fellow, Air Force Research Laboratory, Wright-Patterson Air Force Base, 2021

Faculty Fellow, Naval Research Laboratory, Washington D. C., 2021

Biomechanical Engineering Consultant, Self-employed, El Paso, TX, 2017-2018

Materials Science and Mechanical Engineering Consultant, Self-employed, El Paso, TX, 2015-2016

Mechanical Designer, Harris Consulting Engineers LLC, Las Vegas, NV, 2009-2012

Research Assistant, LeTourneau University, Longview, TX, 2009

Engineering Intern, Harris Consulting Engineers LLC, Las Vegas, NV, 2007-2008

Professional Affiliations

American Society of Mechanical Engineers (ASME) — Member

American Society for Composites (ASC) — Member

Society of Petroleum Engineers (SPE) — Member

Patents

WO Patent 2026/095968, A1 and US Patent 2026/0125963, A1: Magnetically graded adaptor for a wellbore sealing system, May 2026. (Glaesman C, Thatathil S)

US Provisional Patent Application 64/118, 432. Polyaryletherketone Thermoplastics and Composite Blends Modified with Polyetherimide-Rich Materials, November 2025. (Roberson D, Hernandez D)

US Provisional Patent Application 63/920, 009. Functionally Graded Compliant Structures with a Non-linear Load Response Providing a Seamless, Dense Interface when Deployed, November 2025.

US Patent Application 2024/0047111, A1: Functional Gradients in Additive Manufacturing to Tailor Magnetism or Magnetic Fields, February 2024.

US Patent 12, 157, 167 B2: Multi-Material Powder Bed Fusion, Dec 2024. (Slager J).

US Patent 11, 358, 326, B2: Hotend for Additive Manufacturing with an Actuated Rod in a Heated Chamber, June 2022. (Gonzalez R).

US Patent Application 2026/0042255, A1: Dynamic Control of Microstructures during Extrusion, February 2022. (Mckee J, Rybak I)

Publications

Green J, Slager J, Lopez M, Chanoi Z, Stewart C, Gonzlez R. "Physiological Load-response in Synthetic Ligaments through Active Filament-mixing Fabrication." Annals of Biomedical Engineering, 2026.

Slager J, Green J, Chanoi Z, O'Brien D, Levine S, Gonzalez R. "Multi-Material Powder Bed Fusion System Design and Operation." Rapid Prototyping Journal, 2025.

Slager J, Green J, Levine S, Gonzalez R. "The Influence of Print Orientation and Discontinuous Carbon Fiber Content on the Tensile Properties of Selective Laser Sintered Polyamide 12." Polymers, 2025.

Green J, Rybak I, Slager J, Lopez M, Chanoi Z, Stewart C, Gonzlez R. "Local composition control using an active-mixing hotend in fused filament fabrication." Additive Manufacturing Letters, 2023.

Hale R, Green J, Hausselle, J, Gonzalez R. "Quantified In-Vitro tibiofemoral contact during a bodyweight back squat." Journal of Biomechanics, vol. 79, 2018, pp. 21-30.

Green J, Hale R, Hausselle J, Gonzalez R. "A Reconfigurable Multiplanar in vitro Simulator for Real-time Absolute Motion with External and Musculotendon Forces." ASME. J Biomech Eng. 139, 2017, pp. 1-11.

Presentations

Green J, Hernandez D, Rybak I, McKee J. “High-Performance PAEK-PEI Blends Investigated using Active-Filament Mixing Fabrication.” Oral Presentation and Manuscript. The 37th Annual International Solid Freeform Fabrication Symposium, Austin, TX, 2026.

Rybak I, Cubillas M, McKee J, Green J. “Using Near-Net Shape Structures Printed by Fused Filament Fabrication to Characterize Tensile Property Anisotropy in Composite Polymers.” Oral Presentation and Manuscript. The 37th Annual International Solid Freeform Fabrication Symposium, Austin, TX, 2026.

McKee J, Rybak I, Green J. “Print-Planning Using Edge-Weights and Streamlines for Close Alignment of Toolpaths to Objective-Informed Vector Fields.” Oral Presentation and Manuscript. The 37th Annual International Solid Freeform Fabrication Symposium, Austin, TX, 2026.

Hernandez D, Green J. “Processing and Print Orientation Effects on the Tensile Behavior of Additively Manufactured PEEK-PEI Blends for High-Temperature Applications.” Poster Presentation. COURI Symposium. El Paso, TX, 2026.

Best Presentation in Engineering, Computation and Applied Sciences

Rybak I, McKee J, Green J. “Increased spatial resolution with a single nozzle in fused filament fabrication through controlled distributions and volume fractions of soluble and insoluble materials including formation of functionally graded lattices.” Oral Presentation and Manuscript. The 36th Annual International Solid Freeform Fabrication Symposium, Austin, TX, 2025.

Hernandez D, Green J. “Printing methods to control PAEK-PEI blend ratios as a means to tailor tensile properties for high-temperature applications.” Poster Presentation. COURI Symposium. El Paso, TX, 2025.

Hernandez D, Green J. “Technology advances for high-temperature additive manufacturing.” COURI Symposium. El Paso, TX, 2025.

Green J, Flores M, Rybak I, Hernandez I, Lopez M, Schey M. “Micro-computed tomography to characterize in situ control of fiber volume fractions in fused filament fabrication.” Oral Presentation and Manuscript. American Society for Composites 39th Annual Technical Conference, San Diego, CA, 2024.

Green J, Rybak I, McKee J, Glaesman C. "Planar and Non-planar Print Patterns in PEEK Flat Backup Rings to Increase Seal Performance Under High Pressure and Temperature.." Oral Presentation and Manuscript. The 36th Annual International Solid Freeform Fabrication Symposium, Austin, TX, 2024.

Rybak I, Hernandez D, Gonzalez R, Green J. "Controlled Distribution of Composition within Extrusions as Enabled by an Active-mixing Hotend." Oral Presentation and Manuscript. The 36th Annual International Solid Freeform Fabrication Symposium, Austin, TX, 2024.

McKee J, Rybak I, Gonzalez R, Green J. "A Print-planning Technique using Edge-weights to Align Toolpaths to Vector Fields." Oral Presentation and Manuscript. The 36th Annual International Solid Freeform Fabrication Symposium, Austin, TX, 2024.

Green J, Rybak I, Glaesman C. "Backup-ring Optimization for High-temperature and High-pressure Applications through Dynamic Composition Modification in Composite 3d Printing." Oral Presentation and Manuscript. 2024 International Petroleum Technology Conference and Exhibition, Saudi Arabia, February, 2024.

Selected to be highlighted as a Journal Paper in Journal of Petroleum Technology

Campos P, Green J, McKee J, Gonzalez R. “A Technique for Tailoring Composition in Thermoformed Prosthetic Sockets Evaluated Using an Empathic Socket.” Oral Presentation. 37th Annual South Central American Society of Biomechanics Conference, Fort Worth, TX, USA, 2024.

Hernandez D, Green J. “Incorporation of non-planar printing through the development of more accurate systems and mechanics for 3D prints.” Poster Presentation. COURI Symposium. El Paso, TX, 2024.

Rybak I, McKee J, Green J. “Process improvements for local composition control in 3D printing.” Poster Presentation. COURI Symposium. El Paso, TX, 2023.

Delgado P, Green J. “Synthesis and characterization of TPU-98 and Polylactic Acid fused filament femur-anterior cruciate ligament-tibia complexes.” Poster Presentation. COURI Symposium. El Paso, TX, 2023.

Marin M, Green J. “Investigating properties of polymer blends in additive manufacturing for synthetic ligament elasticity.” Poster Presentation. COURI Symposium. El Paso, TX, 2022

Padilla A, Green J. “Strain hardening to improve elasticity in additively manufactured synthetic ligaments.” Poster Presentation. COURI Symposium. El Paso, TX, 2022.

Rybak I, Green J. “Development of a Physics-Informed Slicer for Advanced Composition Control in 3D Printing.” Poster Presentation. COURI Symposium. El Paso, TX, 2022.

Mendivil S, Slager J, Green J. “Impact of selective laser sintering print parameters on multi-material/fiber parts.” Poster Presentation. COURI Symposium. El Paso, TX, 2021.

Tinajero C, Slager J, Green J. “Testing and characterizing polylactic acid-hydroxyapatite composite filament for 3D Printing.” Poster Presentation. COURI Symposium. El Paso, TX, 2021.

Vasquez K, Slager J, Green J. “Thermoforming sockets for amputees using 3D-printed sheets of thermoplastics.” Poster Presentation. COURI Symposium. El Paso, TX, 2021.

Honorable Mention in Engineering, Computation and Applied Sciences

Loya E, Green J. “Hotend Design and Development for High-temperature 3D-Printing.” Poster Presentation. COURI Symposium., El Paso, TX, 2021.

Loya E, Green J. “Hotend Design and Development for High-temperature 3D-Printing.” Poster Presentation. COURI Symposium., El Paso, TX, 2020

Best Presentation in Engineering, Computation and Applied Sciences

Chanoi Z, Slager J, Green J. “Filament Fabrication of Composite Materials: Viability of Selective Laser sintering for High Percent Hydroxyapatite Composite Fabrication.” Poster Presentation. COURI Symposium. El Paso, TX, 2020.

Chanoi Z, Lopez M., Slager J, Green J. “Filament Fabrication of Composite Materials: Developing Polyetheretherketone-Hydroxyapatite Filament for 3D Printing of Orthopedic Implants.” Poster Presentation. COURI Symposium. El Paso, TX, 2020.

Chanoi Z, Green J. “Filament fabrication of composite materials.” Poster Presentation. COURI Symposium. El Paso, TX, 2019.

Manal K, Green J, Gonzalez R. “Anatomical Model Evaluation Using In-Vitro Squat Simulation.” Poster Presentation. 42nd Annual American Society of Biomechanics Conference, Rochester, MN, 2018.

Lopez V, Green J, Gonzalez R. “Variable Composition Control in 3D Printing.” Poster Presentation. COURI Symposium. El Paso, TX, 2016.

Green J, Power P, Hausselle J, Gonzalez R. “Performance of A Versatile In Vitro Joint Simulator with Kinetic Chain Testing Capabilities.” Poster Presentation. 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, USA, August, 2015.

Green J, Power P, Hausselle J, Gonzalez R. “A Versatile In Vitro Joint Simulator with Kinetic Chain Testing Capabilities.” Oral Presentation. 37th Annual South Central American Society of Biomechanics Conference, Forth Worth, TX, USA, March, 2015.

Wilkins S, Green J, Hale R, Gonzalez R. “Designing and Refining a New Cadaveric Mounting Process for the UTEP Joint Load Simulator.” Poster Presentation. COURI Symposium. El Paso, TX, 2015.

Wilkins S, Gonzalez R, Green J, Power P. “Refining the research methodology of the UTEP Joint Load Simulator through mechanical design.” Poster Presentation. COURI Symposium. El Paso, TX, 2015.

Hausselle J, Green J, Power P, Gonzalez R. “A Novel In Vitro Joint Load Simulator to Study Joint and Orthopedic Device Behaviors During Highly Dynamic Motions.” Poster Presentation. 7th World Congress of Biomechanics, Boston, USA, July, 2014.

Wilkins S, Green J, Gonzalez R. “Building the UTEP Joint simulator through the use of SolidWorks.” Poster Presentation. COURI Symposium. El Paso, TX, 2014.

Project Experience

Additive Manufacturing

Conceived and developed novel additive manufacturing techniques by leveraging advanced engineering design principles, resulting in two patent awards and the successful commercialization of a new product line.

Oil & Gas High-Temperature and High-Pressure Seals

Leveraged expertise in functionally graded design, additive manufacturing, and high-performance thermoplastic composites to invent novel sealing devices for oil and gas completion tools rated for high-temperature and high-pressure environments — resulting in two patents, one jointly awarded with an industry collaborator and one pending.

Polymer Science

Systematically explored novel polymer blend formulations using advanced additive manufacturing techniques, achieving measurable improvements in processability, ductility, and intralayer bond strength in high-performance thermoplastics — culminating in a patent application and the successful commercialization of a new product line.

Failure Analysis

Applied failure analysis and fractography to investigate a U-bolt fracture in an automotive accident case, establishing the precise sequence of failure events and demonstrating that the vehicle had lost steering capability prior to rollover — providing critical forensic evidence for liability determination.

Biomedical Engineering

Applied biomedical engineering principles to quantify injury risk as a function of delta-V in a motor vehicle accident, providing a law firm with a defensible, evidence-based assessment of the relationship between the biomechanical forces experienced during the collision and the injuries reported.

Research Grants

- Optimization of multi-objective outcomes in AM composites by scaling reinforcement density to FEA results (POA-24-RX-003), Air Force Research Laboratory, 2024-2026, $200,000.
- Additive manufacturing of multiphase polymers (9610046060), Halliburton Energy Services Inc, 2018-2025, $883,000.
- Major Research Instrumentation: Track 1, Acquisition of a Multi-Material Vat Photopolymerization 3D Printer for Interdisciplinary Applications Including Energy Storage, Electronics, and Biomedical, NSF, 2026-2029, $715,278.
- U.S. Department of the Air Force Summer Faculty Fellowship Program, Air Force Research Laboratory, 2023, $24,030.
- ONR Summer Faculty Research Program, Naval Research Laboratory, 2022 $20,000.
- U.S. Department of the Air Force Summer Faculty Fellowship Program, Air Force Research Laboratory, 2022, $25,600.
- ONR Summer Faculty Research Program, Naval Research Laboratory, 2021, $16,500.
- U.S. Department of the Air Force Summer Faculty Fellowship Program, Air Force Research Laboratory, 2021, $24,100.
- In Vitro Evaluation of Knee Arthroplasty, University of North Texas, 2015, $5,000.
- Dodson Research Grant, The University of Texas at El Paso, 2016, $3,000.
- BUILD Scholar Course Development, The University of Texas at El Paso, 2018 $30,200.
- Office of the Provost and COURI MERITUS and SURPASS Research Programs, The University of Texas at El Paso, 2019-2026
- On-Campus Internship Program, The University of Texas at El Paso (16 awards), 2019-2026, $107,616.
- CARES Regional Internship Program, The University of Texas at El Paso, 2020-2022.
- BUILDing Scholars, The University of Texas at El Paso, 2021-2023.