Exponent®
Engineering & Scientific Consulting

Declan Shannon, Ph.D.

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Professional Profile

Dr. Shannon is a materials engineer with diverse expertise in advanced materials characterization, polymer engineering, adhesive systems, and coatings. At Exponent, he supports clients in the technology, consumer electronics, and medical device sectors through failure analysis, characterization, and performance testing of materials and assemblies. His work focuses on understanding how materials behave in complex systems and in demanding environments, using tools such as SEM, spectroscopy, and mechanical testing to evaluate degradation, adhesion, and reliability. With a background in both experimental research and data-driven analysis, Dr. Shannon brings a multidisciplinary approach to solving materials challenges ranging from early-stage materials selection to root cause investigations of device failures in the field.

Dr. Shannon offers cross-disciplinary expertise in polymer science, adhesive systems, coatings, and the mechanical behavior of soft materials, with a focus on failure analysis, materials compatibility, and product reliability. He applies a range of analytical techniques, including scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), Fourier transformed infrared spectroscopy (FTIR), dynamic mechanical analysis (DMA), tensile and fracture testing of polymers, adhesive testing (peel, lap shear), and X-ray scattering (SAXS), to translate complex materials behavior into actionable engineering insights. Their approach blends traditional materials characterization with modern methods such as machine learning (ML) based screening and data analytics (Python, MATLAB) to support precision engineering and accelerated materials development. Dr. Shannon consults with clients across the technology, consumer electronics, energy storage, and medical device industries, helping to resolve manufacturing challenges, qualify new materials, and investigate failures in both field and production environments.

Before joining Exponent, Dr. Shannon completed their doctoral work at UC Santa Barbara, where they developed flow-based synthesis methods for advanced adhesives using machine learning-guided materials selection. Their research also focused on mechanically tunable, bio-inspired polymer films with enhanced mechanical and optical properties.

Academic Credentials & Professional Honors

Ph.D., Materials, University of California, Santa Barbara, 2024

B.S.E., Materials Science and Engineering, University of Michigan, 2019

Heeger Travel Fellowship, UC Santa Barbara

Alfred H. White Memorial Scholarship for excellence in Materials Science

Prior Experience

Graduate student researcher, UC Santa Barbara, 2019-2024

Polymers Engineering Intern, Tesla, 2018

Professional Affiliations

Society of Plastics Engineers, Member, 2016-2019

Publications

Czuczola, M., Hossain, M.S., Shannon, D.P., Morris, P.T., Getty, P.T., Bates, C.M., Read de Alaniz, J. and Hawker, C.J., Telechelic Dithiol Copolymers as Tunable Building Blocks for Synthesizing Multiblock Materials., 2025 J Polym Sci, 63: 759-765. https://doi.org/10.1002/pol.20240876

Shannon, D. P.; Cerdan, K.; Kim, M;, Mecklenburg M; Su, J; Chen, Y; Helgeson, M. E.; Valentine, M., T.; Hawker, C. J.. Bioinspired Metal–Ligand Networks with Enhanced Stability and Performance: Facile Preparation of Hydroxypyridinone (HOPO)-Functionalized Materials. Macromolecules 2024, 57 (24) , 11339-11349. https://doi.org/10.1021/acs.macromol.4c02250

Shannon, D. P.; Moon, J. D.; Barney, C. W.; Sinha, N. J.; Yang, K.-C.; Jones, S. D.; Garcia, R. V.; Helgeson, M. E.; Segalman, R. A.; Valentine, M. T.; Hawker, C. J. Modular Synthesis and Patterning of High-Stiffness Networks by Postpolymerization Functionalization with Iron–Catechol Complexes. Macromolecules 2023, 56 (6), 2268– 2276, DOI: 10.1021/acs.macromol.2c02561

Presentations

Shannon, D., Moon, J., Barney, C., Valentine, M., Hawker, C., Tunable and Patterned Biomimetic Networks via Secondary Metal-Ligand Complex Formation. Oral Presentation, Materials Research Society (MRS), Spring Meeting, San Francisco, CA – 2023

Xu, M., Iwaso, K., Shannon, D., Bates, M., Wang, H., Hawker, C., High throughput synthesis of highly branched polymers, American Chemical Society (ACS), Spring Meeting, San Diego, CA – 2025

Project Experience

Worked in tech transfer with Mitsubishi Chemical to develop high throughput and flow synthesis screenings for adhesive materials. Developed machine learning guided predictions using data analytics for high-throughput materials screening to accelerate materials design and process optimization. (provisional patent filed). Designed and implemented photochemical flow reactors for continuous synthesis of high molecular weight, low dispersity polymers using (PET-)RAFT polymerization.

Led collaborative team research and published first author paper on engineering of bioinspired polymer films and networks with tunable mechanical properties (up to 100x increase in Young's modulus) via metal-ion chelation. (Shannon, D., et al., Macromolecules 2023). Engineered surface patterned films and networks with tunable optical and magnetic properties using soft lithography techniques & published first author paper (Shannon, D., et al., Macromolecules 2024).Designed and built microfluidic flow reactors for microparticle synthesis to probe nanoscale water transport and impact of sidechain chemistry in hydrogels via spectroscopic analysis (publication submitted).

Peer Reviews

Journal of Polymer Science