Rong Yuan, Ph.D., P.E.
Principal Engineer-Materials and Mechanical Engineering
Licensed Professional Engineer in California and Arizona

SUMMARY

Dr. Rong Yuan is a materials and mechanical engineering expert with 26 years of combined research, industry, and consulting experience. She specializes in failure analysis, finite element analysis, stress analysis, mechanical and electrical testing, materials characterization, and reliability evaluation across a broad range of consumer, industrial, and medical products.

Her consulting portfolio includes hundreds of lithium-ion and alkaline battery failure investigations in devices such as e-cigarettes, cell phones, laptops, power banks, e-bikes, e-scooters, hoverboards, drones, and medical devices. She also investigates failures involving metals, ceramics, polymers, corrosion, welds, bolts, piping, valves, ladders, fall-protection systems, and industrial components.

Dr. Yuan's background spans advanced ceramics, steels for energy applications, electronic packaging, and large-scale industrial systems. She has extensive experience in quality assurance, reliability testing, failure mode and effect analysis (FMEA), design of experiment (DOE), Six Sigma, and statistical process control (SPC).

CORE TECHNICAL EXPERTISE

- Stress, fracture, and fatigue analysis
- Mechanical testing & fractography
- Finite element analysis (Abaqus)
- Mechanical design (SolidWorks, ASME GD&T Y14.5)
- Microstructure characterization (SEM/EDS, EBSD, XRD, XRF, FTIR, OM)
- Lithium-ion battery testing & electrical characterization
- Metals, ceramics, polymers, corrosion
- Thin-film electroplating
- Reliability testing, DOE, Six Sigma, SPC
- Supplier and manufacturing process management
- Semiconductor packaging, testing, and thermal-mechanical modeling

EDUCATION

PhD, Materials Science and Engineering, UC Berkeley
MS, Materials Science and Engineering, UC Berkeley
BS, Materials Science and Engineering, Tsinghua University, Beijing, China

PROFESSIONAL EXPERIENCE:

2017 – Present, Principal Engineer & Expert
Berkeley Engineering And Research, Inc., Berkeley, CA

- Conduct extensive research and testing of lithium-ion and alkaline batteries, including hundreds of explosion and fire investigations in e-cigarettes, phones, laptops, power banks, talkies, e-bikes, e-scooters, hoverboards, drones, and medical devices.
- Perform mechanical, electrical, and materials failure analysis across diverse systems, including:
    - Hip implants, LVAD systems, pacemakers
    - Turbine and generator trip/throttle valves
    - Water treatment systems and galvanized pipe failures
    - Automotive components: bearings, spindles, pintle hooks, exhaust systems, airbags
    - Propane regulators and gas system failures
    - Weld and bolt failures in cranes, bridges, and chemical plant piping
    - Plastic and brittle material failures
- Investigate burn injuries from heat blankets, spas, water heaters, and medical devices.
- Conduct ladder failure analysis and fall-protection research for construction and telecom industries.
- Perform food plant process evaluations and patent infringement analyses.
- Serve as on-site metallurgist and materials scientist for laboratory testing.

2017 – Present, Technical Advisor for CellMo Inc.

- Provide expert guidance on development, application, and optimization of metal foam products.
- Support R&D and production teams with materials, mechanical, and reliability insights.

2008 – 2016 Senior Packaging Engineer, Test Engineer, TPM
Intel Corporation, Chandler, AZ

- Led planning, execution, and delivery of high-performance, cost-effective test solutions for server, client, and mobile chipsets.
- Managed suppliers and ensured compliance with mechanical, electrical, and dimensional requirements for socket design and integrated heat spreader design.
- Designed sockets and mechanical components using SolidWorks under GD&T Y14.5.
- Conducted thermo-mechanical modeling (Abaqus) for FCxGA product design and reliability optimization.
- Supported HVM excursions, root-cause investigations, and DOE-based process improvements.
- Executed pathfinding for first- and second-level interconnect solder technologies.

2007 – 2008 Senior Metallurgist
Berkeley Engineering and Research, Inc.

- Completed over 70 consulting cases involving turbine blade fatigue, propane tank valve failures, power plant shaft failures, tractor radiator failures, truck bearing stress analysis, corrosion failures, and major pipeline incidents.

2000 – 2006 Graduate Research Assistant, Advisor: Prof. Robert O. Ritchie
UC Berkeley & Lawrence Berkeley National Laboratory

- Investigated hydrogen-induced degradation in steels and superalloys.
- Conducted heat treatment, tension, torsion, bending, fracture toughness, fatigue tests of ceramics, biomaterials, intermetallic and metals.
- Performed microstructure and fractography analysis using XRD, SEM, EDS, TEM, EBSD.
- Studied fracture and fatigue behavior of SiC ceramics up to 1300°C.
- Developed correlations among geometric, weight, and compliance functions in Linear Elastic Fracture Mechanics. Experimentally verified crack-size measurement methods using back-face strain gage and crack-mouth opening techniques.

PUBLICATIONS:

R. Yuan, S. Jin, G. Stevick, "Failure Analysis of Fire in Lithium-Ion Battery-Powered Heating Insoles: Case Study", *Batteries* 2025, 11(7), 271. https://doi.org/10.3390/batteries11070271.

P. Novak, R. Yuan, B.P. Somerday, P. Sofronis, R.O. Ritchie, "A Statistical, Physical-Based, Micro-Mechanical Model of Hydrogen-Induced Intergranular Fracture in Steel", Journal of the Mechanics and Physics of Solids, 58 (2010), p 206-226. https://doi.org/10.1016/j.jmps.2009.10.005.

P. Sofronis, M. Dadfarnia, P. Novak, R. Yuan, B. Somerday, I. M. Robertson, R. O. Ritchie, T. Kanezaki, Y. Murakami, "A Combined Applied Mechanical Materials Science Approach Toward quantifying the role of hydrogen in material degradation," in: Proc. of 12th Int. Conf. on Fracture, ICF12 (2009, Ottawa, Canada) (2009).

R. Yuan, J.J. Kruzic, X.F. Zhang, L.C. DeJonghe, and R.O. Ritchie, "Ambient to High-Temperature Fracture Toughness and Cyclic Fatigue Behavior in Al-Containing Silicon Carbide Ceramics", Acta Materialia, v 51, n 20, Dec 8, 2003, p 6477-6491. https://doi.org/10.1016/j.actamat.2003.08.038.

J. J. Kruzic, R. Yuan, R. M. Cannon, R. O. Ritchie, "Determinging Worst-Case Fatigue Thresholds for Grain-Bridging Ceramics", TMS Annual Meeting, 2003.
https://doi.org/10.1002/9781118788035.ch7.

PATENT

Glen Stevick, Philip E Alei, Rong Yuan, US11929514B2 "End cap for battery or cylindrical rechargeable cell", 3/12/2024.

PRESENTATIONS:

"E-cig and Lithium-Ion Battery Explosion, Part I", https://youtu.be/jr_ecYyzZUc

"Mechanical Design of Scooters", https://youtu.be/Skk-ijExNkk

"Lithium Ion Batteries, E-cig, Fire and Explosions" at Inner Circle of Investigators 2019 Platinum Anniversary Educational Conference, Denver, Colorado, October 23-26, 2019.

"E-cigarettes and Lithium Ion Battery Failures" at Society of Forensic Engineers and Scientists, meeting April 5th-7th, 2019.

"Ambient and High Temperature Fracture and Fatigue Properties of a Series of Al-containing ABCSiC", Symposium 3: Ceramics & Composites for Aerospace and Structural Application, 55th Pacific Coast Regional & Basic Science Division Fall Meeting, Oakland, CA, October 20, 2003