



Rong Yuan, Ph.D., P.E.

Forensic Engineer

Materials and Mechanical Engineering

SUMMARY

Dr. Yuan has 8 years of experience in high volume manufacturing (HVM), assembly and testing of microelectronic packaging, and supplier management. She has in-depth knowledge of thermo-mechanical analysis, mechanical design, and testing for FCxGA packages. She also has performed modeling for reliability testing, and supported R&D and HVM using failure mode and effect analysis (FMEA), including design of experiment (DOE) and statistical process control (SPC) methods. With a PhD in Materials Science and Engineering and a PE in Mechanical Engineering, she brings a unique blend of consulting and design skills to cases involving materials and mechanical failures, conducting stress analyses of these different components, such as those of bearings, valves for turbines and generators, pintle hook design, battery and e-cigarette explosions, and many more. She is a licensed P.E. in California and Arizona.

SELECT INDUSTRY EXPERIENCE

- Stress analysis, fracture, and fatigue
- FMEA
- Six-sigma and SPC for HVM support
- DOE
- Failure analysis and fractography
- Corrosion
- Finite element analysis using Abaqus
- Assembly and testing of microelectronic packaging
- Reliability testing and models
- Mechanical design using SolidWorks, tolerance analysis, ASME GD&T Y14.5
- Automobile air bag
- Battery and e-cigarette explosions
- Gas tank, regulator, and pipe failure analysis
- Microstructure characterization using SEM/EDS, XRD, EBSD, polarized OM, etc.
- Metals/ceramics/polymers
- Thin film electroplating
- Failure analysis of bearings, spindles, pintle hooks, etc.
- Valves in turbine generators
- Supplier management
- Auto exhaust pipe failure
- Copper wire investigation for fire
- Spindle and pintle hook failures in auto

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, Forensic Engineer & Expert Berkeley Engineering And Research, Inc., Berkeley, CA

- Evaluation and failure analysis of trip and throttle valves for turbine and generators; water treatment for turbine and generators.
- Research fall protection for construction and telecommunication industries; failure analysis of chain design for construction.
- Conduct bearing analysis and airbag failure analysis for automotive and construction industries.
- Research and testing of lithium-ion batteries. Failure analysis of battery explosions in the e-cigarette industry.
- Failure analysis of pintle hooks.
- Failure analysis of spindles in trucks.
- Failure analysis of propane regulators.
- Plastic failures.
- Fire investigation of residential and commercial sites.
- On-site laboratory metallurgist and material scientist.

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

Technical program manager for test solutions

- Responsibilities included: planning, execution, and deliverables of high-performance, low-cost test solutions, and corresponding collateral designs for server, client and mobile products. Managed suppliers for successful end results.
- Developed socket designs using SolidWorks and AutoCAD according to GD&T Y14.5. Performed lab validation for dimensional, mechanical, and electrical requirements. Pathfinding activities of low-cost, high speed I/O socket and pogo pin solutions.

Thermo-mechanical analyst and lab engineer

- Involved in FCxGA product design and optimized product design by modeling DOEs of thickness/material selection to meet SMT and reliability requirements.
- Optimized new process parameters in assembly and test process for FCxGA products through modeling and lab support.

Senior Packaging Engineer

- Identified root causes and provided quick solutions through supplier management of integrated heat spreader (IHS) and support for HVM excursions on DOEs to identify root cause.
- Executed pathfinding activities of first-level (FLI) and second-level interconnect (SLI) solders.

2007 – 2008 Senior Metallurgist

Berkeley Engineering And Research, Inc., Berkeley, CA

Practiced consulting work for over 70 cases regarding topics such as fatigue-failure analysis of turbine blades; valve failure of propane tanks; failure of engine shaft in power plant explosion; failure of radiator in tractors; stress analysis of bearings in truck; corrosion analysis for water pipes, New York City water pipeline explosion, etc.

2000-2007 Graduate Research Assistant, Advisor: Prof. Robert O. Ritchie UC Berkeley, Lawrence Berkeley National Lab

Hydrogen-Induced Material Degradation: Brittle Decohesion vs. Plastic Flow Localization (collaboration with Sandia National Lab and University of Illinois, Urbana-Champaign)

- Heat-treated, copper-plated, and tested plain carbon steels, ultra high-strength steels and Ni-based super alloys in the presence of hydrogen from -40°C to room temperature.
- Characterized the resulting microstructure and fractography using XRD, SEM, EDS, TEM, and EBSD.
- Investigated mechanisms of hydrogen embrittlement in engineering materials.

Relationships between Geometric Functions, Weight Functions, and Compliance Functions in Linear Elastic Fracture Mechanics

- Found mathematical correlation among geometric function (stress intensity factor K), weight function, and compliance functions in the frame work of LEFM. Systematically studied crack size measurement method through compliance functions and experimentally verified the correlation using back-face strain gage method and crack mouth opening method.

Fracture and Fatigue of Silicon Carbide (SiC) at Elevated Temperature

- Processed toughened SiC ceramics and tested fatigue da/dN curve and fracture toughness from room temperature up to 1300°C. Examined microstructure and fractography using XRD, SEM and EDS. Correlated toughening mechanisms to microstructures and investigated the process-microstructure-property relationship.

PRESENTATIONS:

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

PUBLICATIONS:

R. Yuan, Y He, C Panichas, and M Modi, “Microstructure and Mechanical Properties of Electroplated Nickel-Cobalt Alloys with Cobalt Content Less Than 3wt.%”, presentation at TMS 2012, Orlando, FL.

- X. Lu, K Wheeler, P. Desai, H. Jiang, J. Sanchez, R. Yuan, J. Laird, and M. Garcia, "Using Captive Media to Enable Chip Attach Module Process for Ultra-thin Core Packages: Warpage Reduction Effectiveness Study and Media Design Guidelines", IATTJ, vol. 15, 2012, 125 – 134.
- R. Yuan, M. Modi, K. Lofgreen, M. Schroeder, L. Wojewoda, M. Zeman, C. Panichas, and Y. He, "An Integrated Model for Predicting the Current Carrying Capability of Sort Probes Due to Sort Probe Recession", IATTJ, vol. 14, 2011, 609-620
- R. Yuan, S. Ganapathysubramanian, X. Lu, P. Nardi, E. Lemons, N. Sharma, and A. Xu, "Mechanical Characteristics of a Thin Flipped Chip Ball Grid Array Package", IATTJ, vol. 14, 2011, 119-126.
- P. Start, K. Mirpuri, R. Yuan, C. Weinman, H. Tejada, D. Rebsom, H. How, and M. Renavikar, "Fundamental Understanding of Material and Process Factors on Solder Joint Formation and Performance", IATTJ vol 13, 2010.
- 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.
- N. Labanok, R. Yuan, S.F. Lim, P. Nardi, A. Rosario, Y. Zhao, D. Plaunt, and K.M. Lee, "Characterization and Optimization of Electrolytic Nickel Plating Process to Increase Resistance to Mechanical Damage of Integrated Heat Spreader Lids", IATTJ vol 12, 2009.
- R. Yuan, N. Labanok, K. A. Chua, C. K. Ooi, P. Nardi, D. Kulkarni, P. Liu, and K. Yee, "Structural Requirement on Copper IHS for Chipset Application - Case Study", IATTJ vol 12, 2009.
- D. Bhate, R. Yuan, S. Mahajan, J. Trego, S. Voronov, F. Evans, F. Abraham, "Fundamentals of Laser Mark Readability", Intel Assembly & Test Technology Journal (IATTJ) vol 12, 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.