ARUN KUMAR, PH.D.

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El Segundo, CA 90245

EDUCATION

Ph.D., Engineering, Metallurgy and Metal Processing. Minors: Science of Materials and Corrosion • University of California, Los Angeles, California
M.S., Engineering, Metallurgy and Metal Processing • University of California, Los Angeles, California
B.E. (Hons.), Metallurgical Engineering • Indian Institute of Technology, Roorkee, India
B.Sc., Physics, Chemistry, and Math • University of Lucknow, India

EXPERIENCE

2019-Present

Chief Metallurgist • Eurofins EAG Materials Science LLC

1989-2019

President, Vice President, General Manager • SEAL & EAG Laboratories

- Manage and supervise approximately 15 engineers and technicians
- Perform a variety of analytical services, including failure analysis
- Provide metallurgical consultation
- Serve as expert witness in product liability trials involving materials failures.

1980-1989

Manager, Metallurgy and Materials Science • Scanning Electron Analysis Laboratories, Inc.

- Provide metallurgical consultation to customers
- Materials analysis, failure analysis, and production problem solving
- Materials selection, and forensic studies
- Provide consultation to attorneys for lawsuits involving product liability, product defect and failure analysis

1978-1980

Group Head, Materials Failure Analysis • Hughes Aircraft Company

- Responsible for metallurgical failure analysis of electronic components and devices
- Metallurgy/materials related consultations on various programs
- Problem solving support to prevent manufacturing line stoppage
- Responsible for metallurgical failure analysis/metallography laboratory
- Supervise engineers and technicians in the group

1976-1978

Technical Staff • Rockwell International, B-1 Division

- Performed failure analysis of failed components and structures of the B-1 bomber aircraft during R & D testing and flight testing

1974-1976

Post-Doctoral Research Fellow • University of California-Los Angeles.

- Performed research on Effect of silicon and manganese on the oxidation behavior of Fe-14Cr-14Ni alloy
- Researched Development of Mg-Alloy hydrides for use as a possible source for hydrogen powered automobiles

SKILLS

- Over 40 years of experience in metallurgical failure analysis of aircraft, helicopter, automobile and motorcycle components, machineries, medical implants, machine tools and household appliances
- Failure analysis of metallic and non-metallic (glass, plastic, ceramic, composites, rubber) materials and electronic components
- Fractography and fracture analysis
- Physical metallurgy

EAG LABORATORIES | Eurofins Materials Science

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- High and low temperature oxidation and corrosion of metals and alloys
- Corrosion protection
- Heat treatment of metals and alloys
- Evaluation of welding, brazing, and soldering techniques
- Scanning and transmission electron microscopy, electron microprobe analysis, surface analysis techniques, X-ray diffraction
- Cost-effective material selection, product development, and manufacturing process improvement
- Metallurgical issues in fire investigation.
- Expert witness in product liability and patent infringement trials

PUBLICATIONS

- Kumar, A., S. Ensha, J.F. Irvin, J. Quinn, “Liquid Metal Corrosion Fatigue (LMCF) Failure of Aircraft Engine Turbine Blades”, “Journal of Failure Analysis and Prevention”, Vol. 18, Issue 4, pp. 939-947, August 2018.
- Armstrong, R.W., J. Mason, A. Kumar, and J.E. Hall, "Thermally Induced Failure of Low-Voltage Electrical Nonmetallic-Sheathed Cable Insulation," Fire Technology, National Fire Protection Association, pp. 263-275, August 1999.
- Kumar, A., and J. A. Hess, “Residual Gas Analysis (RGA) of Microelectronic Packages Containing Silicone,” Proceedings of Second International Conference on Emerging Microelectronics and Interconnection Technologies – EMIT ‘98, IMAPS, pp. 188-191, February 1998.
- Kumar, A., “Use of SEM in Aircraft Component Failure Analysis,” Proceedings of Microscopical Society of Canada, Vol. 24, pp. 18-19, June 1997.
- Kumar, A., and M. Carreon, “Residual Gas Analysis as a Failure Analysis Tool for Microelectronics Devices,” Wescon 96 Conference Proceedings, pp. 114-115, October 1996
- Kumar, A., “Metallurgical Techniques for Aircraft Component Failure Analysis,” Aviation Litigation News, American Bar Association, Vol. VII, No. 1, pp. 7-10, April 1996.
- Kumar, A., “Use of Advanced Microanalytical Techniques for Materials Failure Analysis in Microelectronics,” Proceedings of International Conference on Emerging Microelectronics and Interconnection Technologies, ISHM, pp. 407-411, February 1996.
- Kumar, A., and J.O. McClain, Jr., "Improving Device Reliability Through Residual Gas Analysis (RGA)", Proceedings of RL/NIST Workshop on Moisture Measurement
- and Control for Microelectronics, pp. 185-193, April 1993.
- Kumar, A., and S. Ensha, "Premature Torqueing Failure of Cast A356 Aluminum Actuators", Handbook of Case Histories in Failure Analysis, ASM International, Vol. 1, pp. 47-50, 1992.
- Kumar, A., "Aircraft Component Failure Investigation Using Advanced Analytical Techniques", Proceedings of Aviation Insurance Association (AIA), pp. 1-7, May 1992.
- Kumar, A., and C. Dyer, "Characterization of Surface Treated 316L Stainless Steel Tubings to Prevent Contamination in Gas Distribution Systems", Solid State Technology, pp. 89-94, February1987.
- Kashar, L., A. Kumar, S. Sheybany, M. Neff, and L. Barnard, "Quantitative Analysis of Thin Layers Using Microanalytical Techniques", Proceedings of ISTFA '86, ASM International, pp. 5-10 October 1986.
- Neff, M., and A. Kumar, "Localized Hydrogen Attack in a Welded Commercially Pure Titanium Cathode", Proceedings of ISTFA '86, ASM International, pp. 245-250, October 1986.
- Kumar, A., and L. Kashar, "Use of Secondary Ion Mass Spectrometry (SIMS) in Microelectronics Failure Analysis", Proceedings of the 5th Annual Test and Measurement World Exp., pp. 381-391, April 1986.
- Kumar, A., "Fracture Behavior and Mechanical Property Relationship of Cast C90300 Copper Alloy", Proceedings of ISTFA '85, International Society for Testing and Failure Analysis, pp. 268-275, October 1985.

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- Kumar, A., T. Parsons, and D. Dennies, "Surface Analysis of Thin Oxide Films on a Stainless Steel, "Proceedings of ISTFA '84, International Society for Testing and Failure Analysis, pp. 322- 328, October 1984.
- Kashar, L., and A. Kumar, "Advances in Microanalysis Using the SEM/EDX System," Proceedings of ISTFA '82, International Society for Testing and Failure Analysis, pp. 314-321, October 1982.
- Kashar, L., A. Kumar, and J. M. Patterson, "Use of Microanalytical Techniques in PC Board Failure Analysis," Proceedings of the 27th National SAMPE Symposium, pp. 720-728, May 1982.
- Cozzolino, M. J., G. J. Ewell, and A. Kumar, "Solder Coating of Ceramic Capacitors; Wettability Problems," Proceedings of ISTFA `81, International Society for Testing and Failure Analysis, pp.111-116, October 1981.
- Kumar, A., "Case Histories of Metallurgical Failures in Electronics Industry," Fracture and Failure: Analyses, Mechanisms and Application, Proceedings of the ASM 1980 WESTEC Sessions on Failure Analysis, pp. 147-164, 1981.
- Kumar, A., "Failure Analysis of Electronic Component Leads," Proceedings of ATFA `79, Advanced Techniques in Failure Analysis, pp. 28-33, October 1979.
- Young, J. D., and A. Kumar, "Use of Laboratory Failure Simulation Exemplars to Study the Intergranular Fracture Modes in 9Ni-4Co- 0.20C Steel," Fractography in Failure Analysis, ASTM STP 645, American Society for Testing and Materials, pp. 32-47, July 1978.
- Kumar, A., and D. L. Douglass, "Modification of the Oxidation Behavior of High-Purity Austenitic Fe-14Cr-14Ni Alloy by the Addition of Silicon," Oxidation of Metals, 10, No. 1, pp. 1-22, January 1976.
- Kumar, A., M. Nasrallah, and D. L. Douglass, "The Effect of Yttrium and Thorium on the Oxidation Behavior of Ni-Cr-Al Alloys," Oxidation of Metals, 8, No. 4, pp. 227-263, August 1974.
- Kumar, A., D. Rajdev, and D. L. Douglass, "Effect of Oxide Defect Structure on the Electrical Properties of ZrO2," Journal of American Ceramic Society, 55, No. 9, pp. 439-445, September 1972

PATENTS

- "Method of Increasing the Fatigue Life of Titanium Alloy Parts," U.S. Patent No. 4,287,740 issued September 8, 1981.

BOOKS

- Reviewer, Chapter on “Failure Analysis”, Composites, Volume 21, ASM Handbook,
- ASM International, 2001
- Co-author, Chapter on "Failure Mechanisms in Printed Wiring Boards", Electronic Materials Handbook, Volume 1, Packaging, ASM International, 1989.
- Co-author, Chapter on "Use of Microanalytical Techniques in Failure Analysis and Problem Solving", Metals Handbook, Ninth Edition, Volume 11, Failure Analysis and Prevention, American Society for Metals, November 1986.
- Co-editor, Fracture and Failure: Analyses, Mechanisms and Applications, Proceedings of the ASM-1980, WESTEC Session on Failure Analysis, American Society for Metals, 1981.

MEMBERSHIPS

- ASM International (Formerly American Society for Metals)
- The Minerals, Metals & Materials Society (TMS)
- Institute of Electrical and Electronics Engineers (IEEE)
- American Society for Testing and Materials (ASTM)
- Independent Metallurgical Engineering Consultants of California (IMECA)
- NACE International (The National Association of Corrosion Engineers)
- ASM International - Los Angeles, Chapter Chairman (1989-90); WESTEC Conference Program Committee (1981-89); WESTEC Conference Programming Chairman (1989)