BIOGRAPHICAL SKETCH

NAME: John F. Gerling

eRA COMMONS USER NAME: n/a

POSITION TITLE: Consultant, Gerling Consulting, Inc. (dba JFGerling Microwave Applications Consulting)

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
California State University San Diego	Bachelor of Science (with distinction)	12/1982	Mechanical Engineering

A. Personal Statement

My background includes 40+ years in microwave heating for consumer, commercial, industrial and scientific applications. This has included engineering and development of standard and custom products, including microwave clothes dryers, vending ovens, single and multimode applicators, batch and continuous conveyor systems, instrumentation and process controls. Presently I provide consulting services relating to product design, application development, system integration, and failure analysis of microwave systems. Recent projects include design and prototype construction of commercial microwave appliances, custom applicators and waveguide components, technical “white papers” on client-specified topics, and seminars and webinars on microwave heating technologies.

In January 1997, I founded Gerling Applied Engineering, Inc. (GAE) as a consulting firm, later transitioning to the manufacturing of microwave heating equipment for a variety of commercial, industrial and scientific applications. Products and services included standard and custom components and systems with engineering assistance for application development. Core competencies included microwave component engineering and mechanical design, system integration and performance analysis, microwave appliances, and magnetron failure analysis. Responsibilities included corporate management, business development, and product design, development & engineering. In July 2015, GAE was acquired by Muegge GmbH (Reichelsheim, Germany), a manufacturer of microwave equipment for industrial heating and plasma processing. I remained with the company until July 2017, at which time I began work as an independent consultant.

Patents, lectures, keynote, plenary and invited talks are listed in the Appendix following the standard OMB form.

B. Positions, Scientific Appointments and Honors

Mar 1984 – Feb 1992	*Manager, Systems Division*, Gerling Laboratories, Modesto, CA
Feb 1992 – Sep 1998	*Vice President*, General Manager, ASTeX/Gerling Laboratories, Modesto, CA
Jan 1997 – Jul 2015	*Founder and President*, Gerling Applied Engineering, Inc. (GAE), Modesto, CA
Jul 2015 – Jul 2017	*Vice President*, GAE, d.b.a. Muegge-Gerling, Modesto, CA
Jul 2017 – present	*Consultant*, Gerling Consulting, Inc., Gilroy, CA
Sept 2002	*Industrial Program Chair*, 3rd World Congress on Microwave & RF Applications
July 2016	*Ricky Metaxas Pioneer Award*, 3rd Global Congress on Mw Energy Applications
April 2022	*Fellow*, International Microwave Power Institute

PROFESSIONAL AFFILIATIONS

- International Microwave Power Institute (Treasurer, past President, Board member 1991-present)
- Microwave Working Group (Founding Member)
- Association for Microwave Power in Europe for Research and Education
- Institute of Electrical and Electronics Engineers

C. Contributions to Science

Expertise in the application of microwave heating technology to various processes has led to the development of novel apparatus and methods used in basic materials science and research (Gerling, 1991 - 2021). An example is a low cost method using high power variable attenuators to overcome inherent operational instabilities associated with the use of low cost magnetrons in microwave generators to heat very low loss materials (Gerling, 2010).

J Gerling, *Facts and Misinformation about What is "Microwave-Safe" and What is Not*, **Proceedings of the 59th Microwave Power Symposium**, International Microwave Power Institute, Edmonton, Canada, June 2025

B Leier, J Gerling, F van der Merwe, E Bobicki, *Generator Technology Options for Microwave Driven Methane Pyrolysis*, **Proceedings of the 58th Microwave Power Symposium**, International Microwave Power Institute, Reston, VA, May 2024

C Manière, V Yakovlev, J Gerling, E Olevsky, et al. *Multiphysics simulation of flash microwave heating and sintering*, **Proceedings of the 56th Microwave Power Symposium**, International Microwave Power Institute, Savanah, GA, June 2022

M Effinger, J Gerling, et al. *Microwave Sintering: Initial Scale-up for Lunar Landing and Launch Pad Construction*, **Planetary & Terrestrial Mining Sciences Symposium**, Canadian Minerals and Metals Plan, June 2021

C Manière, G Lee, E Torresani, J Gerling, et al. *Flash microwave pressing of zirconia*, **Journal of the American Ceramic Society**, 2020;00:1–12. https://doi.org/10.1111/jace.17072

J Gerling, *Design of a microwave cavity for an atypical commercial application*, **Proceedings of the 53rd Microwave Power Symposium**, International Microwave Power Institute, Las Vegas, NV, June 2019

J Gerling, *Recent developments in solid-state microwave heating*, **AMPERE Newsletter**, Association of Microwave Power in Europe for Education and Research, Issue 89, July 2016

KM Evans-Nguyen, J Gerling, et al. *Towards universal ambient ionization: direct elemental analysis of solid substrates using microwave plasma ionization*, **Analyst,** 2016 Jun 21;141(12):3811-20. https://doi.org/10.1039/C6AN00176A.

EM Moon, J Gerling, et al. *Modeling-based optimization of thermal processing in microwave fixation*, **Proceedings of the 49th Microwave Power Symposium**, International Microwave Power Institute, San Diego, CA, June 2015

J Gerling, *Solid-State Microwave Generators Are Here – Are They Ready?*, **AMPERE Newsletter**, Association of Microwave Power in Europe for Education and Research, Issue 80, March 2014

J Gerling, *High Power Variable Attenuators for Industrial Microwave Processing,* **Proceedings of the 44th Microwave Power Symposium,** International Microwave Power Institute, Denver, CO, June 2010

J Gerling, *Equipment Safety for Microwave and RF Processing,* **Microwave Solutions for Ceramic Engineers**, American Ceramics Society, 2005

J Gerling, *Microwave Clothes Drying – On the Verge of Commercial Reality*, **Appliance Magazine**, April 2003

J Gerling, *Waveguide Components and Configurations for Optimal Performance,* **Microwaves: Theory and Applications in Materials Processing V**, American Ceramics Society, 2001

J Gerling, *A Technical Review of Equipment and Methods for Waveguide Power Measurements in Microwave Heating Applications*, **Microwave and RF Applications,** American Ceramics Society, 1995

J Gerling, G Fournier, *Techniques to Improve the Performance of Microwave Processing Systems Which Utilize High Q Cavities*, **Microwaves: Theory and Applications in Materials Processing**, American Ceramics Society, 1991

D. Research Support

- NASA Phase I STTR: “Microwave Assisted Deposition of Cyanate Ester Composites,” Developed and demonstrated a novel in-situ curing additive manufacturing (AM) technology and high-performance composite materials for automated fabrication of ablative Thermal Protection Systems (TPS). Contract # 80NSSC21C0207, awarded May 2021. Ryan Cowdrey (Raven 3D, LLC), PI. John F Gerling (Gerling Consulting, Inc.), consultant.
- USAF Phase I STTR: “3D Printing Continuous Carbon Fiber Reinforced Epoxy via In-situ Nanocomposite Microwave Curing,” Developed and demonstrated a scalable Direct Ink Writing (DIW) 3D printing method capable of printing epoxy coated continuous carbon fiber (e-CCF) to fabricate extraordinarily high strength-to-weight ratio aircraft parts. Contract # FA8649-21-P-0105, awarded November 2020. Blake Herren (Raven 3D, LLC), PI. John F Gerling (Gerling Consulting, Inc.), consultant.
- NASA Phase I SBIR: “Automated Hybrid Microwave Heating for Lunar Surface Solidification,” Investigated methods using microwave heating to sinter lunar surface materials used in construction of load-bearing structures and surfaces. Proposal # 09-1 X6.01-9649, awarded January 2010. Shawn M Allen (Ceralink, Inc.), PI. John F Gerling (GAE, Inc.), consultant.
- NIH Phase I SBIR: “Microwave-Enhanced Immunoassays to Detect Growth Factors,” Developed technology to accelerate proteomics testing of health-related proteins using microwave energy to accelerate and enhance immunoassays. Grant # 1R43GM076758-01, awarded April 2006. Mark T Martin (Mirari Biosciences, Inc.), PI. John F Gerling (GAE, Inc.), consultant and equipment supplier.
- CARB – Innovative Clean Air Technologies: “Removal of H2S from Biogas and NO_X from Engine Exhaust at a Dairy Digester using Carbon Adsorption and Microwave Technology,” Demonstrated a process using microwave heating to regenerate adsorbent filters in-situ. Grant # ICAT 08-3, awarded June 2009. Rick Wiesner (Sacramento Municipal Utilities District), Technical Project Manager. John F Gerling (GAE, Inc.), consultant and equipment supplier.
- NYSERDA: “Perchloroethylene Wastewater Purifier for Dry Cleaning Facilities,” Demonstrated a process using microwave heating to regenerate adsorbent filters in-situ. Contract STD-10821, awarded December 2009. Warren Chesner (Chesner Engineering, P.C.), PI. John F Gerling (GAE, Inc.), consultant and equipment supplier.
- EPRI: “Countertop Microwave Clothes Dryer,” Developed, constructed and demonstrated a compact microwave clothes dryer for consumer use. Contracts WO6832-01 and WO3417-01, awarded July 1999 and March 2000, respectively. Richard D Smith (Thermo Energy Corporation), PI. John F Gerling (GAE, Inc.), consultant and equipment supplier.

APPENDIX

Patents

- S.R. Givens, C.K. Burnett, R. West, M.J. Goclon, J.F. Gerling, G.C. Monroe IV, “Packaged food product microwave system and method,” U.S. Patent 12096540B2, September 17, 2024.
- B. Herren, R. Cowdrey, J.F. Gerling, “Systems and methods for three dimensional printing using microwave assisted deposition,” U.S. Patent 12076926B2, September 3, 2024.
- S.D. Schultz, J.F. Gerling, “Clothes drying apparatus and method with improved tumbling action,” U.S. Patent 6401362B1, June 11, 2002.
- R.D. Smith, J.F. Gerling, S.D. Schultz, “End of cycle detector and method for microwave clothes dryer,” U.S. Patent 6401357B1, June 11, 2002.
- R.D. Smith, J.F. Gerling, S.D. Schultz, “Compact microwave clothes dryer and method,” U.S Patent 6393725B1, May 28, 2002.
- M. Young, J.F. Gerling, J.E. Gerling, “Microwave system and method for curing rubber,” U.S. Patent 5166484, November 24, 1992.

Lectures, Keynote/Plenary Presentations, Invited Papers

- “Introduction to Reactive Chokes for Industrial Microwave Systems,” **Lecture**, 2nd Global Online Workshop on Next-Gen Industrial Heating, *Association of Industrial Microwave Heating and High-Frequency Applications*, December 2025.
- “History of IMPI and its Role in Applications of Microwave and RF Power,” **Lecture**, 59th Annual Microwave Power Symposium, *International Microwave Power Institute*, June 2025.
- “Microwave Process Performance with Static and Dynamic Loads,” **Short Course**, 59th Annual Microwave Power Symposium, *International Microwave Power Institute*, June 2025.
- “A Brief World History of Microwave Applications and the Influence of Solid-State RF Technology,” **Lecture**, 16th Lecture Meeting, *Japan Society of Electromagnetic Wave Energy Applications (JEMEA)*, May 2025.
- “IMPI – Past, Present and Future Influence on the Advancement of Microwave and RF Power Applications,” **Keynote Speaker**, 5th Global Congress on Microwave Energy Applications, *Japan Society of Electromagnetic Wave Energy Applications*, July 2024.
- “Fundamentals of Industrial Microwave Equipment,” **Short Course**, 58th Annual Microwave Power Symposium, *International Microwave Power Institute*, May 2024.
- “Mw 101.3: Microwave Technology Equipment,” **Lecture**, 2023 Fall Seminar, *International Microwave Power Institute*, October 2023.
- “A Review of Product Development Activity for Solid State RF Cooking,” **Plenary Speaker**, 19th International Conference on Microwave and High-Frequency Applications: AMPERE 2023, *Association for Microwave Power in Europe for Research and Education*, September 2023.
- “Industry Practices for Preventing Hazardous Exposure to Microwave Leakage: Are They Adequate?” **Invited Paper**, 57th Annual Microwave Power Symposium, *International Microwave Power Institute*, June 2023.
- “Challenges of Load Dynamics with Magnetrons and Solid State RF,” **Short Course**, 57th Annual Microwave Power Symposium, *International Microwave Power Institute*, June 2023.
- “Advances in Solid State Cooking & the Advent of the Smart Kitchen 3.0,” **Lecture**, 2022 Fall Seminar, *International Microwave Power Institute*, November 2022.
- “Microwave Power Delivery for Industrial Processing Systems,” **Master Class**, 55th Annual Microwave Power Symposium, *International Microwave Power Institute*, June 2021.
- “Comparing Solid State RF and Magnetrons for Industrial Applications,” **Short Course**, 55th Annual Microwave Power Symposium, *International Microwave Power Institute*, June 2021.

- “A Technical Overview of Applicators for Microwave Heating,” **Lecture**, 2019 Fall Webinar, *International Microwave Power Institute*, November 2019.
- “Are We Nuking (Microwaving) Ourselves? – Truths and misconceptions about hazards associated with microwave ovens and cell phones,” **Lecture**, *Modesto Junior College Science Colloquium*, February 2018.
- “Industrial Microwave Processing,” **Short Course**, 51st Annual Microwave Power Symposium, *International Microwave Power Institute*, June 2017.
- “Microwave Component Configurations for Industrial Heating Systems,” **Short Course**, 3rd Global Congress on Microwave Energy Applications, *Association for Microwave Power in Europe for Research and Education*, July 2016.