

**KADEK W. HEMAWAN**

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**OBJECTIVE**

A full time position in electrical engineering particularly in the area of plasma processing, plasma assisted combustion, research and development

**EDUCATION**

**Doctor of Philosophy in Electrical Engineering** Expected Aug 2008  
Department of Electrical and Computer Engineering  
Michigan State University, East Lansing, MI 48824  
Dissertation topic: "High Pressure Microwave Cavity Reactors for Plasma Assisted Combustion and Diamond Crystalline Film Deposition"

**Master of Science in Electrical Engineering** Jan 2002–Dec 2003  
Michigan State University, East Lansing, MI 48824  
Master's thesis: Numerical Analysis and Experimental Measurements of Material Loadings in Cylindrical Microwave Cavity Applicators

**Bachelor of Science in Electrical Engineering** Aug 1998-Dec 2001  
Michigan State University, East Lansing, MI 48824

**WORK EXPERIENCE**

**Graduate Research Assistant** 01/2002–Present  
Department of Electrical & Computer Engineering, MSU

- Synthesize polycrystalline and single crystal diamond thin film on silicon wafer and HPHT diamond substrates by microwave plasma assisted chemical vapor deposition
- Analyze the grown diamond films and study the growth rate, surface morphology and optical quality by Scanning Electron Microscopy, FTIR, and Raman scattering
- Developed microwave plasma applicators concepts that enable efficient electromagnetic coupling at high pressure regime operation for thin films depositions
- Investigated the behaviors of high pressure microwave plasma discharge by measuring the absorbed power density, gas temperature, and radical species concentrations
- Characterized microwave plasma assisted combustion premixed flame which includes investigating the effect of microwave plasma on flame intensity, temperature, stability under various fuel mixture and performed material etching and surface treatment
- Designed and developed a compact microwave plasma jet torch subsonic flow which can produce mini plasma discharge for materials processing and surface treatments
- Performed plasma diagnostics in microwave ECR using single Langmuir probes to obtain plasma potential, plasma density, electron temperature, and electron energy distribution functions EEDF

**Electromagnetic Consultant**

01/2001-12/2002

Dow Chemical and Polymicro Technologies for MSU

- Constructed and analyzed computer-modeling simulation of rectangular and cylindrical cavity resonators using Ansoft HFSS finite element software
- Investigated electromagnetic Eigen modes (TM/TE/TEM) and wave propagation properties inside cylindrical microwave cavity resonators
- Conducted microwave heating experiments on magnetic material for Dow Chemical and polyamide material for Polymicro Technologies using several types of microwave cavity applicators

**Application Engineer Co-op**

01/2000–12/2000

TelGen Corporation, Lansing, MI 48911

- Provided technical support to customers via email and telephone for the Lucent Ambassador family chips and maintained the Lucent IP phone solution web sites
- Assisted personnel in the process of manufacturing, editing, and testing printed circuit boards on the production floor

**HONORS & ACTIVITIES**

Member of Outstanding student honor society, 2002-2003

Recipient of Global Spartan scholarship, 1998 – 1999

Member of Phi Theta Kappa International honor society, 1997-1998

Member of the IEEE Nuclear and Plasma Sciences Society since 1999

Volunteer for the Science, Engineering, and Technology day at MSU, 2004

**PATENTS**

-“Miniature microwave plasma torch application and method of use thereof” J. Asmussen, T. A. Grotjohn, S. Zuo and K.W. Hemawan, filed on April 2005; United States Patent #20050223992

-“Microwave plasma assisted combustion using plasma torch burner” J. Asmussen, T. A. Grotjohn, K.W. Hemawan, and C.L. Romel, Under USPTO review, May 2006.

-“Compact microwave cavity applicator for plasma assisted combustion” J. Asmussen, K.W. Hemawan, and T. A. Grotjohn submitted Under USPTO review, March 2007.

-“Improved microwave plasma assisted reactors for operation over larger substrate areas and at higher pressures”, J. Asmussen, T. Grotjohn, T. Schuelke, K. W. Hemawan, M. Yaran, Guy Ju, Submitted to the MSU Technologies Intellectual Properties, May 2008

**PUBLICATIONS AND CONFERENCE PAPERS/PROCEEDINGS**

- K. W. Hemawan, T. A. Grotjohn, and J. Asmussen, “High Pressure Microwave Plasma Assisted CVD Thin Films Diamond Deposition”, IEEE ICOPS, Karlsruhe, Germany, June 15-19, 2008 (upcoming)

- K.W. Hemawan, T. A. Grotjohn, D.K. Reinhard, and J. Asmussen, ‘Diamond Synthesis by Microwave Plasma Assisted Chemical Vapor Depositions at 200-300 Torr’, 2<sup>nd</sup> International Conference on New Diamond and Nano Carbons, Taipei, Taiwan, May 26-29, 2008 (upcoming)
- K. W. Hemawan, T. A. Grotjohn, and J. Asmussen, ‘Plasma-Assisted Combustion in a Coaxial Re-entrant Microwave Cavity,’ IEEE Pulsed Power and Plasma Science, Albuquerque, NM, June 17-22, 2007.
- K. W. Hemawan, C.L. Romel, S. Zuo, I. S. Wichman, T. A. Grotjohn, J. Asmussen, ‘Microwave Plasma-Assisted Premixed Flame Combustion,’ Applied Physics Letters, 89,141501, 2006.
- K. W. Hemawan, S. Zuo, C. L. Romel, T. A. Grotjohn, I. Wichman and J. Asmussen, ‘Plasma-Assisted Combustion in a Miniature Microwave Plasma Torch Applicator,’ Gordon Research Conference on Plasma Processing Science, Mount Holyoke College Hadley, MA, July 16-21, 2006.
- K. W. Hemawan, S. Zuo, C. L. Romel, T. A. Grotjohn, I. Wichman and J. Asmussen, ‘Plasma-Assisted Combustion in a Miniature Microwave Plasma Torch Applicator,’ 33<sup>rd</sup> International Conference on Plasma Science, Traverse City, MI, June 4-8, 2006.
- K. W. Hemawan, C. L. Romel, I. S. Wichman, T. A. Grotjohn, and J. Asmussen, ‘Microwave Plasma-Assisted Premixed Flame Combustion,’ Proceedings of the Central States Section of the Combustion Institute, May, 2006, Cleveland, OH.
- Kadek W. Hemawan, Chandra Romel, Indrek Wichman, Timothy Grotjohn, and Jes Asmussen, ‘Microwave Plasma- Assisted Premixed Flame Combustion,’ 3<sup>rd</sup> International Workshop on Micro plasmas, Greifswald Germany, May 9-11, 2006
- K. W. Hemawan, S. Zuo, C. L. Romel, T. A. Grotjohn, I. Wichman, E. Case and J. Asmussen, ‘Plasma-Assisted Combustion in a Miniature Microwave Plasma Torch Applicator,’ 32<sup>nd</sup> IEEE ICOPS, Monterey CA, June 18-22, 2005.
- Kadek W. Hemawan, T.A. Grotjohn and J. Asmussen, ‘Miniature Microwave Plasma Source and Reactor Development,’ 5<sup>th</sup> Emerging Industry Symposium, Ann Arbor, March 31-April 1, 2005.
- T. A. Grotjohn, S. Zuo, K. Hemawan, J. J. Narendra, and J. Asmussen, ‘Design and Operating Characteristics of a Miniature Microwave Plasma Torch,’ Gordon Research Conference on Plasma Processing Science, New Hampshire, Aug. 2004
- K.W. Hemawan, T.A. Grotjohn, and J. Asmussen, ‘Atmospheric Microwave Discharges for Plasma Treatment of Fibers,’ 31<sup>st</sup> International Conference on Plasma Science, Baltimore, June 28-July 1, 2004.
- T.A. Grotjohn, K.W. Hemawan, S. Zuo and J. Asmussen, ‘Miniature atmospheric pressure microwave plasma torch applicators and characteristics,’ 50<sup>th</sup> International AVS Symposium, Baltimore, Nov. 5-9, 2003.
- M. Perrin, K.W. Hemawan, T. Grotjohn, and J. Asmussen, ‘A comparison of the performance between low pressure magnetized and non-magnetized microwave plasma’, 49<sup>th</sup> International Symposium of the American Vacuum Society, Denver, CO 2002.

## REFERENCES

Available upon request