

Hsien-Ping Feng

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EDUCATION

Massachusetts Institute of Technology	Mech. Eng.	Postdoc. Associate	2009.May – 2011.Jul.
National Tsing Hua University	Chem. Eng.	Ph.D.	2003.Sep. – 2008.Jul.
National Tsing Hua University	Chem. Eng.	M.S.	1997.Sep. – 1999.Jul.
National Tsing Hua University	Chem. Eng.	B.S.	1994.Sep. – 1997.Jul.

RESEARCH

MIT NanoEngineering Group 2009 – 2011

- Study a novel “thermoelectric effect” on supercapacitor.
- Developed a new maskless fabrication in depositing a patterned metallic layer onto a substrate with strong adhesion and exceptional uniformity pretreated by nanoparticle immobilization.
- Developed a new technique of depositing an adhesive and uniform contact layer onto a nanostructured Bi₂Te₃-based thermoelectric material pretreated by functionalized SAMs.
- Developed a new polishing process in fabricating scratch-free and smooth surfaces on both n- and p-type nanostructured Bi₂Te₃-based thermoelectric alloys.

Tripod Hsinchu Energy Research Center, Taiwan 2008 – 2009

- Developed a new method of immobilizing poly(*N*-vinyl-2-pyrrolidone)-capped Pt nanoclusters on ITO as a counter electrode for dye-sensitized solar cells (DSSCs).

National Tsing Hua University, Taiwan 2003 – 2008

- Studied the effect of film texture and impurity for Cu CMP.
- Studied oxide formation on the copper interconnect surface at the initial nucleation stage and under light illumination after CMP.

EMPLOYMENT

Tripod Hsinchu Energy Research Center 2008.Feb. – 2009.Mar.

- Deputy Director
R&D for a-Si Thinfilm solar-cell and Dye-sensitized Solar Cells

Taiwan Semiconductor Manufacturing Company (the world's largest semiconductor foundry)

- Technical Manager 2007.Oct. – 2008.Feb.
Transfer RD advanced 45nm CMP process to FAB
- Section Manager, Dep. of Nano-Thin Film Eng. in Fab12 2006.Aug. - 2007.Oct.
Manage 18 members, responsible to 90nm, 80nm, 65nm and 45nm 12-inch Cu CMP

- Principal Engineer, Dep. of Chemical Mechanical Polishing in Fab12 2004.Dec. - 2006.Aug.
Assist section manager to lead 23 members, responsible to 0.13um and 90nm 12-inch copper ECP and CMP process
- Senior Engineer, Dep. of Thin Film in Fab3 2002.Dec. - 2004.Dec.
Responsible to 0.35um, 0.25um, and 0.18um 8-inch PEOX CVD, TiN sputter and CVD-TiN
- Engineer, Dep. of Engineering-2 in Fab4 2001.Mar. – 2002.Dec.
Responsible to 0.5um, 0.35um, 0.25um, and 0.18um 8-inch Co salicide, AlCu sputter, and WCVD
- R.O.C military, Lieutenant of the land force 1999.Jul. – 2001.Mar.

ACTIVITIES and HONORS

Taiwan National Science Council Fellowship 2010

Taiwan National QCC Award

- 20th Award 2007.Oct.
Increase the capacity of Cu CMP polishing“, Represent TSMC to Y2007 20th Taiwan R.O.C QCC competition and win award
- 17th Award 2004.Oct.
0.13um SRAM yield improvement by copper pits reduction“, Represent TSMC to attend Y2004 17th Taiwan R.O.C QCC competition and win award

Internal Award of Taiwan Semiconductor Manufacturing Company

2006 TSMC Fab12 Engineer of the Year
 2004 TSMC Outstanding engineer
 2004 TSMC Patent development award
 2003 TSMC Super engineer
 2003 TSMC Annual Total Quality Management Conference - 1st award
 2003 Fab-3 Annual Patent Development Award
 2003 Fab-3 Annual Improvement Benefit Award
 2003 Fab-3 Q2/Q3 Engineering Contribution - 1st award
 2003 TFTB Q1/Q2 Best Knowledge Management Award
 2002 TSMC Annual Total Quality Management Conference - excellent work
 2002 Fab-4 Q1/Q3 QCC campaign - 1st award

Teaching Experience

Invited lecturer, Chemical Engineer Department, National Chung Hsing University	2009.Feb
Invited lecturer, Chemical Engineer Department, National Tsing Hua University	2008.Dec
Invited lecturer, Chemical Engineer Department, National Cheng Kung University	2008.Apr
Lecturer, Tze Chiang Foundation of Science and Technology	2008.Mar
Invited lecturer, Chemical Engineer Department, National Chung Hsing University	2006.May
Lecturer, Taiwan Semiconductor Manufacturing Company	2006.May-2008.Feb

Invitation to Peer Review

Progress in Photovoltaics : Research and Applications	2010. May
Journal of Electronic Materials	2010. May
Electrochimica Acta	2011. Mar
Electrochemistry Communications	2011. Jan
Materials Chemistry and Physics	2010. Nov
Materials Chemistry and Physics	2010. Oct
Journal of Electronic Materials	2010. Aug
Journal of Alloys and Compounds	2010. Aug
Thin solid films	2010. Jan
Journal of Electronic Materials	2009. Mar
Electrochemistry Communications	2008. Jan

PUBLICATIONS

JOURNALS

1. **Hsien-Ping Feng**, Bo Yu, Z. F. Ren, and Gang Chen, “*Electroplating nickel/gold Low Ohmic Contacts to Nanostructured Bi₂Te₃-Based Alloys pretreated by Self-assembled MPS monolayer*”, in preparation.
2. R.T. Zheng, J.W. Gao, J.J. Wang, **H.P. Feng**, J. S. Jin, H. Ohtani, Jinbo Wang, T.F. Zeng, and G. Chen, “*High Thermal Conductivity Amphiphilic Graphite Suspensions and Their Percolation Phase Change*”, Nano Lett., in review.
3. Daniel Kraemer,* Bed Poudel,* **Hsien-Ping Feng**, J. Christopher Caylor, Bo Yu, Xiao Yan, Yi Ma, Xiaowei Wang, Dezhi Wang, Andrew Muto, Kenneth McEnaney, Matteo Chiesa, Zhifeng Ren, and Gang Chen, “*Solar thermoelectric generators with flat-panel thermal concentration*”, Nature materials, **10**, 532 (2011).
4. **Hsien-Ping Feng**, Trilochan Paudel, Bo Yu, Shuo Chen, Z. F. Ren, and Gang Chen, “*Nanoparticle-Enabled Selective Electrodeposition*”, Advanced materials, **23**, 2454 (2011).
5. **Hsien-Ping Feng**, Bo Yu, Shuo Chen, Kimberlee Collins, Chao He, Z. F. Ren, and Gang Chen, “*Studies on Surface Preparation and Smoothness of Nanostructured Bi₂Te₃-Based Alloys by Electrochemical and Mechanical Methods*”, Electrochimica Acta, **56**, 3079 (2011).
6. Min-Yuan Cheng, Kei-Wei Chen, Tzeng-Feng Liu, Ying-Lang Wang, **Hsien-Ping Feng**, “*Effects of direct current and pulse-reverse copper plating waveforms on the incubation behavior of self-annealing*”, Thin Solid Films, **518**, 7468 (2010).
7. Jo-Lin Lan, **Hsien-Ping Feng**, Tzu-Chien Wei, Chao Peng, Hai-Peng Cheng, Wen-Hsiang Chen, Ya-Huei Chang, Wen-Chi Hsu, Chi-Chao Wan, “*Platinum Nanoparticles on Flexible Carbon Fiber Paper without Transparent Conducting Oxide Glass as Counter Electrode for Dye-sensitized Solar Cells*”, J. Chin. Chem. Soc., **57**, No. 5A (2010).
8. Jo-Lin Lan, Yung-Yun Wang, Chi-Chao Wan, Tzu-Chien Wei, **Hsien-Ping Feng**, Chao Peng, Hai-Peng Cheng, Ya-Huei Chang, Wen-Chi Hsu, “*The Simple and Easy Way to Manufacture Counter Electrode for*

Dye-sensitized Solar Cells”, Current Applied Physics, **10**, S168 (2009).

9. **Hsien-Ping Feng**, Jeng-Yu Lin, Yung-Yun Wang, and Chi-Chao Wan, “*Effect of Light Illumination for Copper Oxidation after Chemical Mechanical Polishing*”, J. Electrochem. Soc., **155**, H620 (2008).
10. **Hsien-Ping Feng**, Jeng-Yu Lin, Ming-Yung Cheng, Yung-Yun Wang, and Chi-Chao Wan, “*Behavior of Copper Removal by CMP and Its Correlation to Deposit Structure and Impurity Content*”, J. Electrochem. Soc. **155**, H21 (2008).
11. Jeng-Yu Lin, Chi-Chao Wan, Yung-Yun Wang, and **Hsien-Ping Feng**, “*Void Defect Reduction after Chemical Mechanical Planarization of Trenches Filled by Direct/Pulse Plating*”, J. Electrochem. Soc. **154**, D139 (2007).
12. Jeng-Yu Lin, Yung-Yun Wang, Chi-Chao Wan, and **Hsien-Ping Feng**, Min-Yuan Cheng “*Impurity Induced Localized Corrosion between Copper and Tantalum Nitride during Chemical Mechanical Planarization*”, Electrochem. Solid-State Lett, **10**, H23 (2007).
13. **H.P. Feng**, M.Y. Cheng, Y.Y. Wang, and C.C. Wang, “*Investigation of the Behaviors of Various Electroplated Copper films during CMP*”, Nanotech, **1**, 248 (2006).
14. **H.P. Feng**, M.Y. Cheng, Y.L. Wang, S.C. Chang, Y.Y. Wang, and C.C. Wan, “*Mechanism for Cu Void Defect on Various Electroplated Film Conditions*”, Thin Solid Film, **498**, 56 (2006).
15. Chi-Wen Liu, Ying-Lang Wang, Ming-Shih Tsai, **Hsien-Ping Feng**, Shih-Chieh Chang, and Gwo-Jen Hwang, “*Effect of Plating Current Density and Annealing on Impurities in Electroplated Cu film*”, J. Vac. Sci. Technol, A23, **658** (2005).
16. **H.P. Feng**, Y. Wu, Y.Y. Wang, and C.C. Wan, “*Electroless Cu Deposition Process on TiN for ULSI Interconnect Fabrication via Pd/Sn Collid Activation*”, J. Electronic Material, **32**, 9 (2003).
17. Y. Wu, W.C. Chen, **H.P. Feng**, C.C. Wan, and Y.Y. Wang, “*Displacement Reaction between Metal Ions and Nitride Barrier Layer/Silicon Substrate*”, J. Electrochem. Soc. **149**, G309 (2002).

CONFERENCE PROCEEDINGS

1. Gang Chen, Daniel Kraemer, Bed Poudel, **Hsien-Ping Feng**, J. Christopher Caylor, Giri Joshi, Bo Yu, Xiao Yan, Yi Ma, Xiaowei Wang, Dezhi Wang, Andrew Muto, Kenneth McEnaney, Matteo Chiesa, Zhifeng Ren, “*Solar Thermoelectric Energy Conversion*”, 2011 Thermoelectrics Application Workshop, San Diego, Jan. 2011.
2. Bo Yu, Hui Wang, Yucheng Lan, Xiao Yan, Bed Prodel, James C. Caylor, **Hsien-Ping Feng**, Gang Chen, Zhifeng Ren, “*Studies of sputtered Metal Interlayers on Metallization of Bismuth Telluride Based Thermoelectric Materials*”, MRS: Thermoelectric Materials for Solid-State Power Generation and Refrigeration, Boston, USA, Nov. 2010.
3. Tzu-Chien Wei, **Hsien-Ping Feng**, Jo-Lin Lan, Chao Peng, Ya-Huei Chang, Wen-Chi Hsu, Hai-Peng Cheng, Wen-Hsiang Chen, “*Engineering work on high transparent and high performance counter electrode for DSSC*”, 3rd International Conference on the Industrialisation of DSC (DSC-IC 09), Nara, Japan. Apr. 2009.
4. Wen-Chi Hsu, Tzu-Chien Wei, Ya-Huei Chang, Jo-Lin Lan, **Hsien-Ping Feng**, Chao Peng, Hai-Peng Cheng, Wen-Hsiang Chen, “*An Environmental Friendly Ionic Liquid as Alternative Iodide Source for Dye-Sensitized Solar Cell*”, The 3rd Japan-Korea Bilateral Workshop on Dye-sensitized and Organic Solar Cell, Kitakyushu, Japan, pp. 69, Dec. 2008.

5. Ya-Huei Chang, Wen-Chi Hsu, Tzu-Chien Wei, Jo-Lin Lan, **Hsien-Ping Feng**, Chao Peng, Hai-Peng Cheng, Wen-Hsiang Chen, “*How Charge Transfer Resistance of Tri-iodide Reduction in PVP-Pt Counter Electrode Affect Fill Factor in IV Curves*”, The 3rd Japan-Korea Bilateral Workshop on Dye-sensitized and Organic Solar Cell, Kitakyushu, Japan, pp. 50, Dec. 2008.
6. Chao Peng, Tzu-Chien Wei, **Hsien-Ping Feng**, Wen-Hsiang Chen, Hai-Peng Cheng, Jo-Lin Lan, Ya-Huei Chang, Wen-Chi Hsu, Chih-Heng Lien, “*Synthesizing Platinum Nano-Clusters and Its Application to Manufacture Counter Electrode for Dye Sensitized Solar Cells*”, International Symposium on Solar Cells and Solar Fuels, Dalian, China, pp. 50, Dec. 2008.
7. Hai-Peng Cheng, Jo-Lin Lan, **Hsien-Ping Feng**, Tzu-Chien Wei, Wen-Chi Hsu, Chao Peng, Ya-Huei Chang, Wen-Hsiang Chen, “*Immobilization of Nano-Platinum Particles on a Porous Conductive Layer and Its Application for Dye Sensitized Solar Cells*”, International Symposium on Solar Cells and Solar Fuels, Dalian, China, pp. 49, Dec. 2008.
8. Jo-Lin Lan, Yung-Yun Wang, Chi-Chao Wan, Tzu-Chien Wei, **Hsien-Ping Feng**, Chao Peng, Hai-Peng Cheng, Ya-Huei Chang, Wen-Chi Hsu, “*The Simple and Easy Way to Manufacture Counter Electrode for Dye-sensitized Solar Cells*”, Renewable Energy 2008 International Conference and Exhibition, Busan, Korea, pp. 256, Oct. 2008.
9. Tzu-Chien Wei, Jo-Lin Lan, Chao Peng, Ya-Huei Chang, Wen-Chi Hsu, Hai-Peng Cheng, **Hsien-Ping Feng**, Wen-Hsiang Chen, “*Engineering Work on Counter Electrode for DSSC*”, 2008 Taiwan DSSC Technology Workshop, HsinChu, Taiwan, pp. 34, Aug. 2008.
10. Jo-Lin Lan, Chao Peng, Ya-Huei Chang, Wen-Chi Hsu, Hai-Peng Cheng, **Hsien-Ping Feng**, Wen-Hsiang Chen, Tzu-Chien Wei, “*Improving Performance of PVP-capped Pt Nanoclusters Counter Electrode on DSSC by Heat Treatment*”, ACEC 2008 6th Asian Conference on Electrochemistry, Taipei, Taiwan, pp 50, May 2008.
11. Jeng-Yu Lin, Chi-Chao Wan, Yung-Yun Wang, and **Hsien-Ping Feng**, Min-Yuan Cheng, “*Effect of Agglomerated Cu Seed Layer on Cu Removal Rate during Chemical Mechanical Planarization*”, Meet Abstr. - Electrochem. Soc. **702**, 1291 (2007).
12. **H.P. Feng** and C.C. Wan, “*Possibility of Direct Electrochemical Copper Deposition*”, the 19th meeting of the Electrochemical Society, May2-6 (1999).

PATENTS

United States Patent

1. **Hsien-Ping Feng**, Gang Chen, Yu Bo, Zhifeng Ren, Shou Chen, “*Method for forming contact layers on thermoelectric or semiconductor substrates*”, US Patent Application Serial No. 12/932,372. (filed on February 24, 2011).
2. His-Kuei Cheng, Jung-Chih Tsao, **Hsien-Ping Feng**, Min-Yuan Cheng, Steven Lin, Ray Chuang, “*Apparatus and method for preventing copper peeling in ECP*”, US Patent No. 7667835, Feb 23, 2010.
3. His-Kuei Cheng, Hung-Ju Chien, Hsun-Chang Chan, Chu-Chang Chen, Ying-Lang Wang, Chin-Hao Su, **Hsien-Ping Feng**, Shih-Tzung Chang, “*Semiconductor Devices Having Post Passivation Interconnections And a Buffer Layer*”, US Patent No. 7528478, May 5, 2009.
4. **Hsien-Ping Feng**, Ming-Yuang Cheng, Si-Kwua Cheng, Steven Lin, Jung-Chih Tsao, Chen-Peng Fan, Chi-Wen Liu, “*Method and Apparatus for Stabilizing Plating Film Impurities*”, US Patent No. 7481910,

Jan 27, 2009.

5. **Hsien-Ping Feng**, Jung-Chih Tsao, Hsi-Kuei Cheng, Chih-Tsung Lee, Min-Yuan Cheng, Steven Lin, Ray Chuang, Chi-Wen Liu, “*Post ECP Multi-Step Anneal/H.Sub.2 Treatment to Reduce Film Impurity*”, US Patent No. 7432192, Oct 7, 2008.
6. **Hsien-Ping Feng**, Min-Yuan Cheng, Hsi-Kuei Cheng, Steven Lin, Huang-Yi Huang, Yuh-Da Fan, “*Method for Conductive Film Quality Evaluation*”, US Patent No. 7262067, Aug 28, 2007.
7. Jung-Chih Tsao, Chi-Wen Liu, **Hsien-Ping Feng**, Hsi-Kuei Cheng, Steven Lin, Min-Yuan Cheng, “*Method to Eliminate Plating Copper Defect*”, US Patent No. 7256120, Aug 14, 2007.
8. Chi-Wen Liu, **Hsien-Ping Feng**, Jung-Chih Tsao, “*Method and Apparatus for Copper Film Quality Enhancement with Two-Step Deposition*”, US Patent No. 7189650, Mar 13, 2007.
9. Chi-Wen Liu, Jung-Chih Tsao, **Hsien-Ping Feng**, Kei-Wei Chen, Shih-Chi Lin, Ray Chuang, “*Method of Reducing the Pattern Effect in the CMP Process*”, US Patent No. 7183199, Feb 27, 2007.
10. Jung-Chih Tsao, Chi-Wen Liu, Si-Kua Cheng, Che-Tsao Wang, Steven Lin, **Hsien-Ping Feng**, Chen-Peng Fan, “*Method for Preventing Voids in Metal Interconnects*”, US Patent No. 7122471, Oct 17, 2006.
11. **Hsien-Ping Feng**, Jung-Chih Tsao, Hsi-Kuei Cheng, Chih-Tsung Lee, Min-Yuan Cheng, Steven Lin, Ray Chuang, Chi-Wen Liu, “*Post ECP Multi-Step Anneal/H₂ Treatment to Reduce Film Impurity*”, US Patent No. 7030016, Apr 18, 2006.
12. Hsi-Kuei Cheng, Hung-Ju Chien, Hsun-Chang Chan, Chu-Chang Chen, Ying-Lang Wang, Chin-Hao Su, **Hsien-Ping Feng**, Shih-Tzung Chang, “*Method For Reducing Defects in Post Passivation Interconnect Process*”, US Patent No. 7026233, Apr 11, 2006.
13. Hsi-Kuei Cheng, Chu-Chang Chen, Ting-Chun Wang, Szu-An Wu, Ying-Lang Wang, **Hsien-Ping Feng**, “*Chamber Leakage Detection by Measurement of Reflectivity of Oxidized Thin Film*”, US Patent No. 6985222, Jan 10, 2006.

Taiwan R.O.C Patent

1. Chao Peng, Jo-Lin Lan, Ya-Huei Chang, Wen-Chi Hsu, Hai-Peng Cheng, **Hsien-Ping Feng**, Wen-Hsiang Chen, Tzu-Chien Wei, “*Method of Forming an Electrode Including an electrochemical catalyst layer*”, TWN Patent Application No. 20090263569, Oct. 22, 2010.
2. Jung-Chin Tsao, Chi-Wen Liu, Hsi-Kuei Cheng, Che-Tsao Wang, Steven Lin, **Hsien-Ping Feng**, Chen-Peng Fan, “*Method for preventing voids in metal interconnects*”, TWN Patent No. I302015, Oct. 11, 2008.
3. Hsi-Kuei Cheng, Chieh-Tsao Wang, **Hsien-Ping Feng**, Min-Yuan Cheng, Jung-Chin Tsao, Steven Lin, Ray Chuang, Chyi Tsong Ni, “*Method of Forming Sputtering Layer*”, TWN Patent No. I298523, Jul. 1, 2008.
4. Chi-Wen Liu, **Hsien-Ping Feng**, Jung-Chih Tsao, “*Method for Copper Film Quality Enhancement with Two-Step Deposition*”, TWN Patent No. I287246, Sep. 21, 2007.
5. Hsi-Kuei Cheng, **Hsien-Ping Feng**, Min-Yuan Cheng, Jung-Chih Tsao, Shih-Chi Lin, Ray Chuang, “*Methods for Electrochemical Deposition (ECD) and for Fabrication Integrated Circuit Devices on a Semiconductor Substrate with Damascene Structures and Defect-Free ECD Metal Layer on The Semiconductor Wafer*”, TWN Patent No. I281211, May 11, 2007.

6. Chi-Wen Liu, Jung-Chih Tsao, **Hsien-Ping Feng**, Kei-Wei Chen, Shih-Chi Lin, Ray Chuang, “*Method of Reducing Pattern Effect in CMP Process, Method of Eliminating Dishing Phenomena After CMP Process, and Method of CMP Rework*”, TWN Patent No. I274629, Mar. 1, 2007.
7. **Hsien-Ping Feng**, Min-Yuan Cheng, Hsi-Kuei Cheng, Shih-Chi Lin, Jung-Chih Tsao, Chen-Peng Fan, Chi-Wen Liu, “*Method and Apparatus for Stabilizing Plating Film Impurities*”, TWN Patent No. I269375, Dec. 21, 2006.
8. **Hsien-Ping Feng**, Jung-Chih Tsao, Hsi-Kuei Cheng, Chih-Tsung Lee, Min-Yuan Cheng, Steven Lin, Ray Chuang, Chi-Wen Liu, “*Interconnect and Method of Fabricating The Same*”, TWN Patent No. I267930, Dec. 1, 2006.
9. Jung-Chih Tsao, Chi-Wen Liu, Kei-Wei Chen, Jye-Wei Hsu, **Hsien-Ping Feng**, Shih-Chi Lin, Chuang Ray, “*A Novel Method to Reduce Rs Pattern Dependence Effect Field of The Invention*”, TWN Patent No. I245366, Dec. 11, 2005.
10. **Hsien-Ping Feng**, Ming-Yuan Cheng, Hsi-Kuei Cheng, Shih-Chi Lin, Hung-Yi Huang, Yu-Da Fan, “*Method for Conductive Film Quality Evaluation*”, TWN Patent No. I240348, Sep. 21, 2005.
11. Hsi-Kuei Cheng, Chun-Chang Chen, Ting-Chun Wang, Sez An Wu, Ying Lang Wang, **Hsien-Ping Feng**, “*A Method of Detecting Chamber Leakage*”, TWN Patent N0. 571380, Jan. 11, 2004.