WEI-HSUN CHEN

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EDUCATION

Ph. D. candidate, Materials Engineering, *Purdue University, West Lafayette, IN* — May 2014
Research: Thin Film Characterization and Stress Analysis on the Formation of Whisker in Pb-Free Sn-alloy Solder and Electroplated Films — GPA: 3.98/4.00

M. S., Physics, *National Taiwan University, Taipei, Taiwan* — June 2007
M.S. Thesis: Formation of Pattern during Anodization of Tungsten — GPA: 4.00/4.00

B. S., Physics, *National Taiwan University, Taipei, Taiwan* — January 2005
Specialization in the field of solid state electronics and electro-optics — GPA: 3.79/4.00

PROFESSIONAL EXPERIENCE

School of Materials Engineering, *Purdue University, West Lafayette, IN* — 8/2009–present
Graduate Researcher, **Tin Whisker Group**
Collaborated with Foresite, Inc. and Global Testing Services, Inc. on accelerated testing of tin whiskers
- Performed experiments on SAC305 solder and Pb-free electroplated Sn films; characterized thin film microstructure and properties; assessed whisker growth risk via accelerated testing

Collaborated with Carnegie Mellon University on modeling of microstructural response to stress in thin films
- Performed simulation to determine mechanical responses of thin films in ambient and thermal cycling conditions, predicted whisker propensity of a particular finish
- Determined grain orientations for whiskers and Sn films for 3D modeling and stress analysis

Intel Corporation, *Chandler, AZ* — 6/2013–8/2013
Package Failure Analysis Summer Intern
- Will be responsible for identifying and researching component failures; perform systematic EBSD and SEM study for failure analysis and determine root cause.

Institute of Atomic and Molecular Sciences, *Academia Sinica, Taiwan* — 9/2008–8/2009
Research Assistant, **Surface Nanostructure Laboratory** — 8/2005–9/2007
- Conducted the research on spontaneous formation of ordered nanobubbles in anodic oxide film; performed electroplating and material characterization (SEM, AFM, and TEM)

Graduate Institute of Photonics and Optoelectronics, *National Taiwan University, Taiwan* — 8/2004–7/2005
Undergraduate Researcher, **Electro-Optics Laboratory**
- Investigated the behavior of electromagnetic waves in photonic crystal structures by the Finite-Difference Time-Domain (FDTD) method

Graduate Institute of Physics, *National Taiwan University, Taiwan* — 8/2003–7/2004
Undergraduate Researcher, **Cryogenic Electric-Optics Semiconductor Laboratory**
- Conducted the research on cooling metal substrates down to 3 K by Top-Loading He-3 System and measured electric signals by Lock-In Amplifier

TECHNICAL SKILLS

Scanning Electron Microscopy (SEM) with Energy Dispersive X-ray Spectroscopy (EDX), Electron Backscatter Diffraction (EBSD), and Focused Ion Beam (FIB)
- Investigated surface morphology and microstructure of Sn solder, electroplated thin films and whiskers; analyzed film composition, crystallographic grain orientation, and texture (preferred grain orientation).

Synchrotron Micro-Diffraction and Data Analysis
- Used beamline 12.3.2 of the Advanced Light Source at Lawrence Berkeley National Laboratory to obtain the evolution of grain orientations and strain distribution before and after whisker nucleation due to thermal cycling.

Finite Element Analysis (FEA), Matlab, and Mathematica
- Simulated mechanical properties of thin films under different stress-generating mechanisms; modeled grain orientations for given fiber textures; analyzed stress/strain distributions

Physical Vapor Deposition (PVD), Atomic Force Microscopy (AFM) and Surface Profilometer
- Performed radio-frequency sputtering system for thin film deposition of various materials; investigated surface morphologies of thin film in nano- and micro-scales

Electroplating
- Anodized tungsten foil (varying current density , voltage, and composition) to form thin tungsten oxide films

TEACHING AND MENTORING EXPERIENCE

School of Materials Engineering, *Purdue University, West Lafayette, IN*

Mentor for Undergraduate Researchers 2012–2013

- Mentored D.A. Lowing on EBSD measurement on polished Al foils
- Mentored J. Holaday on analysis and visualization of data from simulation

Graduate Instructor for Structures & Properties of Materials Class 2010 & 2012

- Graded homework, quizzes, and exams
- Held office hours and led two recitations of 30 students

School of Physics, *National Taiwan University, Taiwan*

Project facilitator and Mentor in Physics for Gifted High School Students 2005–2006

- Guided students in Computer Simulation Laboratory
- Held office hours for General Physics and General Mathematics

Teaching Assistant for Modern Physics Class 2005–2006

Teaching Assistant for Linear Algebra Class 2005

PUBLICATIONS

P. Sarobol, J.P. Koppes, **W.H. Chen**, P. Su, J.E. Blendell and C.A. Handwerker, "Recrystallization as a Nucleation Mechanism for Whiskers and Hillocks on Thermally Cycled Sn-Alloy Solder Films," *Material Letters*, Vol. 99, pp 76-80, May 2013.

P. Sarobol, **W.H. Chen**, A.E. Pedigo, P. Su, J.E. Blendell and C.A. Handwerker, "Effects of Local Grain Misorientation and β-Sn Elastic Anisotropy on Whisker and Hillock Formation," *Journal of Materials Research*, Vol. 28, Issue 05, pp 747-756, Jan. 2013.

W.H. Chen, M.Y. Lai, K.T. Tsai, C.Y. Liu, Y.L. Wang, "Spontaneous Formation of Ordered Nanobubbles in Anodic Tungsten Oxide during Anodization," *Journal of Physical Chemistry C*, Vol. 115, Issue 38, pp 18406-18411, Sep. 2011.

CONFERENCE PRESENTATIONS AND POSTERS

(a complete list of conference presentations available upon request)

W.H. Chen, Y. Wang, P. Sarobol, J. Koppes, J. E. Blendell, and C.A. Handwerker, *Stress/Strain Analysis and Anisotropic Effects on Whisker Formation in Thermally-Cycled Tin Films*, Contributed poster presentation. TMS, San Antonio, TX, March 3-7, 2013.

P. Sarobol, **W.H. Chen**, Y. Wang, J. P. Koppes, A. E. Pedigo, P. Su, J. E. Blendell, and C.A. Handwerker, *Tin Whisker Formation: A Predictive Model based on Local Microstructure and Grain Boundary Properties*, Contributed oral presentation. Tin Whisker Group Telecon, Jan 30, 2013.

W.H. Chen, P. Sarobol, J. Koppes, P. Su, J. E. Blendell, and C.A. Handwerker, *Evaluation of Anisotropic Effect on Defect Formation in Tin Film under Compressive Environment and Thermal Hold Condition*, Contributed oral presentation. MS&T, Pittsburgh, PA, October 7-11, 2012.

B.S. Anglin, **W.H. Chen**, P. Sarobol, R.A. Lebensohn, A.D. Rollett , J.E. Blendell, and C.A. Handwerker, *Residual Compressive Stress in Pb-Free Solders*, Contributed. MS&T, Columbus, OH. October 17-21, 2011.

P. Sarobol, **W. Chen**, J. E. Blendell, P. Su and C.A. Handwerker, *Effects of Grain Misorientations and Strain Distribution n the Location of Whisker Formation on Electroplated Sn-Cu films*, Contributed oral presentation. The SMTA International Conference. Fort Worth, TX, October 16-20, 2011.

HONORS

Purdue University Bilsland Dissertation Fellowship August 2013–2014

Awarded first place in TMS Poster Contest March 2013

Awarded third place in IPC-APEX EXPO Academic Poster Competition April 2011

Learning Partners from Dean's List, *National Taiwan University, Taiwan* Fall 2003–Spring 2004

(*The qualification is given each academic year to students ranking within the top 10% of their classes.*)

Presidential Awards of National Taiwan University, *National Taiwan University, Taiwan* Fall 2003

(*The awards is given each semester to students ranking within the top 5% of their classes.*)