

# Jing-Han Chen, Ph.D

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## Professional Summary

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I am a highly-experienced material physicist with proven-track record of working independently, training students as well as collaborating with scientists from diverse backgrounds. I authored and co-authored 24 articles in applied physics, inorganic chemistry and material science journals with over 200 citations. I have developed successful proposals for national computing and synchrotron facilities as a principal investigator, and have been invited as a reviewer for peer-reviewed journals.

### My specialties in experimental solid state physics and scientific computing

- **Synthetic technique:** metallurgical synthesis, metalorganic vapor phase epitaxy (MOCVD), cleanroom fabrication
- **Material Characterization:** X-ray diffraction (XRD), magnetometer, Raman spectrometer, calorimeter, thermogravimetric analysis (TGA), cryogenic system, conductivity measurement, nuclear magnetic resonance (NMR)
- **Scientific Programming:** C++, density-functional calculation, Linux, Bash Shell, Fortran

## Education

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**PhD in Applied Physics**, Texas A&M University, College Station, Texas, USA **Aug 2015**

*Thesis Title: Specific Heat and Magnetic Properties of Ni-Mn-In Heusler Alloys*

**M.S. in Physics**, National Taiwan University, Taipei, Taiwan **Jul 2006**

*Thesis Title: Magnetotransport properties in AlGaIn/GaN and AlGaAs/GaAs two-dimensional electron systems*

**B.S. in Physics**, National Taiwan University, Taipei, Taiwan **Jun 2004**

## Professional Experience

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**Postdoctoral Researcher** **Mar 2017 – present**

Department of Physics and Astronomy, Louisiana State University, Baton Rouge, Louisiana, USA

- Maintained the cryogenic material characterization instrument routinely
- Optimized the magnetocaloric and barocaloric properties of Ni<sub>2</sub>Mn-based and NiMnSi-based materials for cooling applications
- Developed the robotic experimental methodology to avoid the discrepant results among different measurement techniques and protocols
- Managed technical and programmatic process on multiple projects, and established and maintained the local and remote collaborative relationship

**Postdoctoral Research Associate** **Feb 2016 – Feb 2017**

Department of Chemistry, Rice University, Houston, Texas, USA

- Optimized the metalorganic vapour phase epitaxy (MOCVD) apparatus by setting up the temperature regulator used routinely

- Developed the experimental strategy in the collaborative environment within the limitation of time and resource
- Comprehensively literature review on binary phosphides, and their magnetic, structural and electronic properties

#### **Postdoctoral Research Associate**

**Sep 2015 – Feb 2016**

Department of Physics and Astronomy, Texas A&M University, College Station, Texas, USA

- Supervision of graduate students to improve radio frequency circuit in cryogenic NMR measurement probe
- Developed the research proposal for national experimental facility and high-performance computing center

#### **Research Assistant**

**Jun 2011 – Aug 2015**

Department of Physics and Astronomy, Texas A&M University, College Station, Texas, USA

- Constructed the 1900°C state-of-the-art furnace with the temperature controller from discarded hardware to make intermetallic materials and alloys, especially Fe-Al and Al-V system
- Optimized the signal-to-noise ratio due to the fluorescence on the conventional X-ray spectrometer
- Proficient in Rietveld refinement to characterize the crystallography properties of materials in detail
- Successfully explored local material behavior by performing the broad line nuclear magnetic resonance (NMR) on various solid state materials
- Triple the computation capability by independently building 3-nodes Linux PC cluster with 16 processors and 40 GB memory
- Developed an improved analysis protocol capable of measuring specific heat across 1st order transition based on the commercial pulse-relaxation calorimeter

#### **Teaching Assistant**

**Aug 2009 – May 2011**

Department of Physics and Astronomy, Texas A&M University, College Station, Texas, USA

- In charge of 3 sessions of the recitations and lab composed of 20 undergraduates
- Designed the quiz after the recitations to evaluate the students' understanding
- Enhance students understand the physical concept through the laboratory

#### **Research Assistant**

**Dec 2007 – Jul 2009**

Research Center for Applied Sciences, Academia Sinica, Taipei, Taiwan

- Conducted the high-performance computing research on the quantum transport in mesoscopic systems, especially single molecular device and nanoelectronics
- Successfully constructed the dynamic state of experiments by means of computational quantum chemistry
- Built a successful physical model which is applicable to exploring the detailed mechanism of the electrical transport in mesoscopic systems

#### **Compulsory Community Service**

**Jul 2006 – Sep 2007**

Assistant in Public Lodgment Office, Taiwan Changhua District Court, Changhua, Taiwan

#### **Research Assistant**

**Sep 2004 – Jul 2006**

Department of Physics, National Taiwan University, Taipei, Taiwan

- Well-trained for the semiconductor device fabrication in the clean room such as mask aligner, thermal evaporation and photolithography
- Conducted the magnetoresistivity measurement of two-dimensional electron systems, especially in AlGaIn/GaN and AlGaAs/GaAs heterojunction

### Teaching Assistant

Sep 2004 – Jul 2006

Department of Physics, National Taiwan University, Taipei, Taiwan

- Graded weekly homework and provided the office hours for undergraduates in general physics classes

### Sponsored Projects

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- “Martensitic transitions of shape memory alloys  $(\text{MnNiSi})_{0.62}(\text{FeCoGe})_{0.38}$ ” sponsored by Advanced Photon Source, Argonne National Laboratory, Illinois, USA  
**Role in Project: Principal Investigator**  
 Period: 2018
- “Magneto-structural transition in NiMnSi-based shape memory alloys” sponsored by Advanced Photon Source, Argonne National Laboratory, Illinois, USA  
**Role in Project: Principal Investigator**  
 Period: 2018
- “Magnetostructural Phase Transitions and Multicaloric Materials” sponsored by the Office of Basic Energy Sciences, Materials Sciences and Engineering Division of the U.S. Department of Energy  
**Role in Project: Postdoctoral Researcher**  
 Period: 2017 – present
- “Advanced Solid Materials Synthesis by Designing Inorganic Precursors” sponsored by the Extreme Science and Engineering Discovery Environment (XSEDE), the National Science Foundation in USA  
**Role in Project: Principal Investigator**  
 Period: 2016
- “Preparation of Advanced Nanomaterials from Single Source Designer Precursors” sponsored by Division of Chemistry, the National Science Foundation in USA  
**Role in Project: Postdoctoral Research Associate**  
 Period: 2016 – 2017
- “The Chemistry of Nanomolecules” sponsored by the Welch Foundation in Houston, Texas, USA  
**Role in Project: Postdoctoral Research Associate**  
 Period: 2016 – 2017
- “Magneto-structural coupling in Ni-Mn-In magnetocaloric materials” sponsored by Advanced Photon Source, Argonne National Laboratory, Illinois, USA  
**Role in Project: Principal Investigator**  
 Period: 2015
- “Materials World Network: Microstructural Design for Enhanced Efficiency in Solid State Energy Conversion” sponsored by Division of Materials Research, the National Science Foundation in USA  
**Role in Project: Research Assistant**  
 Period: 2011 – 2016

- “ Magnetism and Anharmonic Lattice Vibrations in Clathrates and Related Materials ” sponsored by the Welch Foundation in Houston, Texas, USA  
Role in Project: Research Assistant  
Period: 2011 – 2016
- “ Magnetism and Electronic Behavior of Ge and Sn Clathrates and Related Zintl Materials ” sponsored by the Welch Foundation in Houston, Texas, USA  
Role in Project: Research Assistant  
Period: 2011 – 2016
- “ Conductance of the nano-scale molecular device: First-principles calculations of the length dependence ” sponsored by Ministry of Science and Technology in Taiwan  
Role in Project: Research Assistant  
Period: 2007 – 2009
- “ Non-invasive measurements on semiconductor nanostructures ” sponsored by Ministry of Science and Technology in Taiwan  
Role in Project: Research Assistant  
Period: 2004 – 2006
- “ Transport and spin in semiconductor nanostructures ” sponsored by Ministry of Science and Technology in Taiwan  
Role in Project: Research Assistant  
Period: 2004 – 2006

### Conference Activity/Participation

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- American Physical Society March Meeting, March 2-6, 2015, San Antonio, Texas, USA  
Talk: Entropy and magnetic properties of Ni-Mn-In magnetocaloric materials
- Joint Meeting of the Texas Section of the American Physical Society, Oct 18-19, 2014, College Station, Texas, USA  
Talk: Entropy and magnetic properties of Ni-Mn-In magnetocaloric materials
- The 3rd International Institute on Multifunctional Materials for Energy Conversion (IIMEC) School on Computational Materials Science, June 2-11, 2014, College Station, Texas, USA
- American Physical Society March Meeting, March 18-22, 2013, Baltimore, Maryland, USA  
Talk: Heat Capacity and Magnetic Properties of Ni-Mn-In, Ni-Co-Mn-In and Ni-Co-Mn-Sn Metamagnetic Materials
- The 9th Workshop on First-Principles Computational Materials Physics, July 1-3, 2009, Cheng Ching Lake, Kaohsiung, Taiwan
- The 11th Asian Workshop on First-Principles Electronic Structure Calculations, Nov. 2-5, 2008, National Sun Yat-sen University, Kaohsiung, Taiwan
- The 8th Workshop on First-Principles Computational Materials Physics, July 1-3, 2008, Hui-Sun Forest Station, Nantou, Taiwan
- Spring School on First-Principles Computational Materials Research - Introductory Level, Mar. 15-16, 2008, National Center for High-Performance Computing, Hsinchu, Taiwan
- Mini-Workshop on Quantum Transport and Current-Driven Dynamics in Molecular-Scale Electronics, Feb. 29, 2008, National Taiwan University, Taipei, Taiwan

- Annual Meeting of The Physical Society of Republic of China, Jan. 16-18, 2006, National Taiwan University, Taipei, Taiwan  
Poster: Experimental evidence for Drude-Boltzmann-like transport in a two-dimensional electron gas in an AlGa<sub>N</sub>/Ga<sub>N</sub> heterostructure
- The 4th International Conference on Advanced Materials and Devices, Dec. 5-7, 2005, Jeju, South Korea  
Poster: Experimental evidence for Drude-Boltzmann-like transport in a two-dimensional electron gas in an AlGa<sub>N</sub>/Ga<sub>N</sub> heterostructure

## Honor

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2014-2016 AAAS/Science Program for Excellence in Science

2006 Dean's Award from College of Science, National Taiwan University

2004 Amateur Soft Tennis Team Champion of the national intercollegiate athletic meeting in Taiwan

1. Ahmad Us Saleheen, **Jing-Han Chen**, David P. Young, Igor Dubenko, Naushad Ali, and Shane Stadler, “ Critical behavior in  $\text{Ni}_2\text{MnGa}$  and  $\text{Ni}_2\text{Mn}_{0.85}\text{Cu}_{0.15}\text{Ga}$  ”, *Journal of Applied Physics*, Vol. 123, 203904 (2018)
2. Sudip Pandey, **Jing-Han Chen**, Ahmad Us Saleheen, Igor Dubenko, Anil Aryal, Philip W. Adams, Shane Stadler, Naushad Ali, “ Specific Heat and the Influence of Hydrostatic Pressure on the Phase Transitions in  $\text{Ni}_{50}\text{Mn}_{35}\text{In}_{14.25}\text{B}_{0.75}$  ”, *Journal of Magnetism and Magnetic Materials*, Vol. 463, 19 (2018)
3. **Jing-Han Chen**, Ahmad Us Saleheen, Philip W. Adams, David P. Young, Naushad Ali, and Shane Stadler, “ On entropy determination from magnetic and calorimetric experiments in conventional giant magnetocaloric materials ”, *Journal of Applied Physics*, Vol. 123, 145101 (2018)
4. **Jing-Han Chen**, Nickolaus M. Bruno, Zhenhua Ning, William A. Shelton, Ibrahim Karaman, Yujin Huang, Jianguo Li, Joseph H. Ross, Jr., “ Relative cooling power enhancement by tuning magneto-structural stability in Ni-Mn-In Heusler alloys ”, *Journal of Alloys and Compounds*, Vol. 744, 785 (2018)
5. Sudip Pandey, Ahmad Us Saleheen, Abdiel Quetz, **Jing-Han Chen**, Anil Aryal, Igor Dubenko, Shane Stadler, and Naushad Ali, “ Magnetic and magnetocaloric properties of Ni-Mn-Cr-Sn Heusler alloys under the effects of hydrostatic pressure ”, *AIP Advances*, Vol. 8, 056408 (2018)
6. **Jing-Han Chen** and Kenton H. Whitmire, “ A structural survey of the binary transition metal phosphides and arsenides of the *d*-block elements ”, *Coordination Chemistry Reviews*, Vol. 355, 271 (2017)
7. Sudip Pandey, Ahmad Us Saleheen, Abdiel Quetz, **Jing-Han Chen**, Anil Aryal, Igor Dubenko, Philip W. Adams, Shane Stadler and Naushad Ali, “ The effects of hydrostatic pressure on the martensitic transition, magnetic, and magnetocaloric effects of  $\text{Ni}_{45}\text{Mn}_{43}\text{CoSn}_{11}$  ”, *MRS Communications*, Vol. 7, 885 (2017)
8. Desmond E. Schipper, **Jing-Han Chen**, and Kenton H. Whitmire, “ Iron carbonyl clusters with  $\text{ECl}_2$  units ( $\text{E} = \text{P}, \text{As}$ ) ”, *Journal of Organometallic Chemistry*, Vol. 849-850, 279 (2017)
9. Zhenhuan Zhao, Desmond E. Schipper, Andrew P. Leitner, Hari Thirumalai, **Jing-Han Chen**, Lixin Xie, Fan Qin, Md Kamrul Alam, Lars C. Grabow, Shuo Chen, Dezhi Wang, Zhifeng Ren, Zhiming Wang, Kenton H. Whitmire, and Jiming Bao, “ Bifunctional metal phosphide  $\text{FeMnP}$  films from single source metal organic chemical vapor deposition for efficient overall water splitting ”, *Nano Energy*, Vol. 39, 444 (2017)
10. Andrew P. Leitner, Desmond E. Schipper, **Jing-Han Chen**, Adam C. Colson, Irene Rusakova, Binod Kumar Rai, Emilia Morosan, and Kenton H. Whitmire, “ Synthesis of Hexagonal  $\text{FeMnP}$  Thin Films from a Single-Source Molecular Precursor ”, *Chemistry - A European Journal*, Vol. 23, 5565 (2017)
11. Andrew P. Leitner, **Jing-Han Chen**, Desmond E. Schipper, and Kenton H. Whitmire, “ Thin Films of  $(\text{Fe}_{1-x}\text{Co}_x)_3\text{P}$  and  $\text{Fe}_3(\text{P}_{1-x}\text{Te}_x)$  from the Co-Decomposition of Organometallic Precursors by MOCVD ”, *Chemistry of Materials*, Vol. 28, 7066 (2016)
12. Ali A. Sirusi, Sedat Ballikaya, **Jing-Han Chen**, Ctirad Uher, and Joseph H. Ross, Jr., “ Band Ordering and Dynamics of  $\text{Cu}_{2-x}\text{Te}$  and  $\text{Cu}_{1.98}\text{Ag}_{0.2}\text{Te}$  ”, *Journal of Physical Chemistry C*, Vol. 120, 14549 (2016)

13. **Jing-Han Chen**, Nickolaus M. Bruno, Ibrahim Karaman, Yujin Huang, Jianguo Li, and Joseph H. Ross, Jr., “ Direct Measure of Giant Magnetocaloric Entropy Contributions in Ni-Mn-In ”, *Acta Materialia*, Vol. 105, 176 (2016)
14. Timothy D. Brown, Nickolaus M. Bruno, **Jing-Han Chen**, Ibrahim Karaman, Joseph H. Ross, Jr., and Patrick J. Shamberger, “ A Preisach-Based Nonequilibrium Methodology for Simulating Performance of Hysteretic Magnetic Refrigeration Cycles ”, *The Journal of The Minerals, Metals & Materials Society*, Vol. 67, 2123 (2015)
15. Yujin Huang, Qiaodan Hu, Nickolaus M. Bruno, **Jing-Han Chen**, Ibrahim Karaman, Joseph H. Ross, Jr. and Jianguo Li, “ Giant elastocaloric effect in directionally solidified Ni-Mn-In magnetic shape memory alloy ”, *Scripta Materialia*, Vol. 105, 42 (2015)
16. **Jing-Han Chen**, Nickolaus M. Bruno, Ibrahim Karaman, Yujin Huang, Jianguo Li, and Joseph H. Ross, Jr., “ Calorimetric and magnetic study for Ni<sub>50</sub>Mn<sub>36</sub>In<sub>14</sub> and relative cooling power in paramagnetic inverse magnetocaloric systems ”, *Journal of Applied Physics*, Vol. 116, 203901 (2014)
17. Nickolaus M. Bruno, Cengiz Yegin, Ibrahim Karaman, **Jing-Han Chen**, Joseph H. Ross, Jr., Jian Liu, and Jianguo Li, “ The effect of heat treatments on Ni<sub>43</sub>Mn<sub>42</sub>Co<sub>4</sub>Sn<sub>11</sub> meta-magnetic shape memory alloys for magnetic refrigeration ”, *Acta Materialia*, Vol. 74, 66 (2014)
18. **Jing-Han Chen**, Ali Sirusi Arvij, Xiang Zheng, Sergio Y. Rodriguez, and Joseph H. Ross, Jr., “ NMR and Computational Study of Ba<sub>8</sub>Cu<sub>x</sub>Ge<sub>46-x</sub> Clathrate Semiconductors ”, *Journal of Alloys and Compounds*, Vol. 593, 261 (2014)
19. Yu-Hui Tang, V. M. Kemal Bagci, **Jing-Han Chen**, and Chao-Cheng Kaun, “ Conductance of Stretching Oligothiophene Single-Molecule Junctions: A First-Principles Study ”, *Journal of Physical Chemistry C*, Vol. 115, 25105 (2011)
20. Po Zhung Chen, Li-Hung Lin, Chi-Te Liang, Jyun-Ying Lin, **Jing-Han Chen**, Michelle Y. Simmons, and David A. Ritchie, “ Electron Heating and Current Scaling in a GaAs Two-Dimensional Electron System ”, *Journal of the Korean Physical Society*, Vol. 50, 1662 (2007)
21. Ethirajulu Senthamarai Kannan, Gil-Ho Kim, Jyun-Ying Lin, **Jing-Han Chen**, Kuang Yao Chen, Zhi-Yao Zhang, Chi-Te Liang, Li-Hung Lin, Doo-Hyeb Youn, Kwang-Yong Kang, and Nai-Chuan Chen, “ Experimental Evidence for Weak Insulator-Quantum Hall Transitions in GaN/AlGaIn Two-Dimensional Electron Systems ”, *Journal of the Korean Physical Society*, Vol. 50, 1643 (2007)
22. Chi-Te Liang, Zhi-Hao Sun, Ching-Lien Hsiao, Ming-Zheng Hsu, Li-Wei Tu, Jyun-Ying Lin, **Jing-Han Chen**, Yang Fang Chen, and Chien Ting Wu, “ Huge positive magnetoresistance in an InN film ”, *Applied Physics Letters*, Vol. 90, 172101-1 (2007)
23. **Jing-Han Chen**, Da-Ren Hang, Chun-Feng Huang, Tsai-Yu Huang, Jyun-Ying Lin, Szu-Hsien Lo, J. C. Hsiao, Ming-Gu Lin, Michelle Y. Simmons, David A. Ritchie, and Chi-Te Liang, “ Experimental Studies of Low-Field Landau Quantization in Two-Dimensional Electron Systems in GaAs/AlGaAs Heterostructures ”, *Journal of the Korean Physical Society*, Vol. 50, 776 (2007)
24. Jyun-Ying Lin, **Jing-Han Chen**, Gil-Ho Kim, Hun Park, Doo-Hyeb Youn, Chang Min Jeon, Jeong Min Baik, Jong-Lam Lee, Chi-Te Liang, and Yang Fang Chen, “ Magnetotransport Measurements on an AlGaIn/GaN Two-Dimensional Electron System ”, *Journal of the Korean Physical Society*, Vol. 49, 1130 (2006)



25. **Jing-Han Chen**, Jyun-Ying Lin, Jung-Kai Tsai, Hun Park, Gil-Ho Kim, Doo-Hyeb Youn, Hyun-Ick Cho, Eun-Jin Lee, Jung-Hee Lee, Chi-Te Liang, and Yang Fang Chen, “ Experimental evidence for Drude-Boltzmann-like transport in a two-dimensional electron gas in an AlGaN/GaN heterostructure ”, *Journal of the Korean Physical Society*, Vol. 48, 1539 (2006)
26. **Jing-Han Chen**, Jyun-Ying Lin, Jung-Kai Tsai, Hun Park, Gil-Ho Kim, Jungseok Ahn, Hyun-Ick Cho, Eun-Jin Lee, Jung-Hee Lee, Chi-Te Liang, and Yang Fang Chen, “ Experimental evidence for Drude-Boltzmann-like transport in a two-dimensional electron gas in an AlGaN/GaN heterostructure ”, *physica status solidi (c)*, Vol. 3, 1713 (2006)



## References

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### Shane Stadler

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### Kenton H. Whitmire

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### Joseph H. Ross, Jr.

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