

# Shuo Chen

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## EDUCATION

B.S., Department of Physics, Peking University, Beijing, China	98-02
Ph. D., Department of Physics, Boston College, Chestnut Hill, MA, USA	02-06
Postdoctoral Associate, Electrochemical Energy Laboratory, ME, MIT, Cambridge, MA, USA	06-09
Postdoctoral Associate, Nanoengineering group, ME, MIT, Cambridge, MA, USA	09-11

## APPOINTMENTS

Assistant Professor, Department of Physics and TcSUH, University of Houston	9/13-Now
Research Assistant Professor, Department of Physics and TcSUH, University of Houston	1/13-8/13
Research Assistant Professor, Department of Physics, Boston College	11-12

## HONOR and AWARDS

Robert A. Welch Endowed Professorship, TcSUH, 2014

## RESEARCH ACTIVITIES

My research focuses on understanding and application of novel materials: carbon nanotubes for electronics, thermoelectric materials and electrocatalysts for energy conversion, and battery materials for energy storage. I am particularly interested in the effects of interfaces on materials' properties. Using *in situ* transmission electron microscopy (TEM), I revealed the electron scattering and failure mechanism of carbon nanotubes at large bias and joule heat [*Appl. Phys. Lett.* 87, 263107 (2005), *Phys. Rev. Lett.* 94, 236802 (2005), *etc.*]. We further discovered the superplasticity of single-, double-, and multi-wall carbon nanotubes at elevated temperatures [*Nature* 439, 281 (2006), *Nano Lett.* 6, 1699-1705 (2006), *etc.*]. For thermoelectric materials, I discovered a new half-Heusler compound that reduced 50% materials cost compared with the state-of-the-art n-type half-Heusler materials with comparable performance [*Adv. Energy Mater* 3, 1210-1214 (2013)]. I have also investigated the interfacial microstructures and compositions of various thermoelectric materials to elucidate their properties [*Science* 338, 936-939 (2012), *J. Am. Chem. Soc.* 134, 17731-17738 (2012), *etc.*]. For electrocatalysts, I obtained a Pt-Co alloyed nanoparticles as highly efficient electrocatalysts for oxygen reduction reaction, the bottleneck reaction of the proton exchange membrane fuel cells. My observation from aberration-corrected TEM on the Pt-Co nanoparticles was the first direct evidence of the Pt skin structure, which causes the four times higher activity than the most active single element Pt nanoparticles [*J. Am. Chem. Soc.* 130, 13818-13819 (2008), *J. Phys. Chem. C* 113, 1109-1125 (2009), *J. Electrochem. Soc.* 157, A82-A97 (2010), *etc.*]. My group is currently producing the best non-noble metal based electrocatalysts for low temperature water electrolysis [*Nano Lett.* 16, 7604-7609 (2016), *Nat. Commun.* 7, 12765 (2016), *etc.*]. We are also developing new materials for lithium ion and sodium ion batteries. As a result, I have co-authored more than 80 papers in peer reviewed journals with a total citation of >7600 and an H-index of 40. I have also given more than ten invited talks in conferences and university colloquia and seminars.

## RESEARCH FUNDING

- Co-PI for “Vibration spectrometer for detecting single atoms using carbon nanotube resonator arrays”, funded by Defense Threat Reduction Agency, \$400,000/\$1.8 M, (2013-2018).
- PI for “Transmission electron microscopy studies for Toyota Research Institute of North America”, funded by Toyota Motor Corporation, \$8,500 (2014-2017).
- PI for “TcSUH Welch Foundation Professorship” \$75,000 (2014-2017).
- Co-PI for “Tools to study interfaces for superconducting, thermoelectric, and magnetic materials at the University of Houston”, funded by DoD-Defense University Research Instrumentation Program (DURIP), \$195,403/\$781.612 (2014-2016).
- PI for “Study on microstructures of interface between metal contacts and thermoelectric materials”, funded by GMZ Energy, Inc., \$60,000 (2012).

## PUBLICATIONS (89 papers with a total citation > 7900, \* indicates corresponding author, \_ indicates the names of students or postdocs from my group).

1. Zhensong Ren, Jing Shuai, Jun Mao, Qing Zhu, Shaowei Song, and **Shuo Chen\***, “Significantly enhanced thermoelectric properties of p-type  $\text{Mg}_3\text{Sb}_2$  via co-doping of Na and Zn”, in revision, (2017).
2. Nanami Takeda, Satoshi Hoshino, Lixin Xie, **Shuo Chen**, Issei Ikeuchi, Ryuichi Natsui, Kensuke Nakura, Naoaki Yabuuchi, “Reversible Li storage for nanosize cation/anion-disordered rocksalt-type oxyfluorides:  $\text{LiMoO}_2\text{-xLiF}$  ( $0 \leq x \leq 2$ ) binary system”, *Journal of Power Sources*, in press.
3. Zhenhuan Zhao, Fan Qin, Sashank Kasiraju, Lixin Xie, Md Kamrul Alam, **Shuo Chen**, Dezhi Wang, Zhifeng Ren, Zhiming Wang, Lars C. Grabow, Jiming Bao, “Vertically aligned  $\text{MoS}_2/\text{Mo}_2\text{C}$  hybrid nanosheets grown on carbon paper for efficient electrocatalytic hydrogen evolution”, *ACS Catalysis*, in press.
4. Fei Hu Du, Yizhou Ni, **Shuo Chen**, Hui Ying Yang, “Green fabrication of silkworm cocoon-like silicon-based composite for high-performance Li-ion batteries”, *ACS Nano*, in press.
5. Ze Yang, Jingying Sun, Yizhou Ni, Zhenhuan Zhao, Jiming Bao, **Shuo Chen\***, “Facile synthesis and in situ transmission electron microscopy investigation of a highly stable  $\text{Sb}_2\text{Te}_3/\text{C}$  nanocomposite for sodium-ion batteries”, *Energy Storage Materials*, 9, 214-220 (2017).
6. Desmond E. Schipper, Zhenhuan Zhao, Andrew P. Leitner, Lixin Xie, Fan Qin, Md Kamrul Alam, **Shuo Chen**, Dezhi Wang, Zhifeng Ren, Zhiming Wang, Jiming Bao, and Kenton H. Whitmire, “A  $\text{TiO}_2/\text{FeMnP}$  Core/Shell Nanorod Array Photoanode for Efficient Photoelectrochemical Oxygen Evolution”, *ACS Nano*, 11, 4051–4059, (2017).
7. Ran He, Hangtian Zhu, Jingying Sun, Jun Mao, Heiko Reith, **Shuo Chen**, Gabi Schierning, Kornelius Nielsch, Zhifeng Ren, “Improved thermoelectric performance of n-type half-Heusler  $\text{MCo}_{1-x}\text{Ni}_x\text{Sb}$  ( $\text{M} = \text{Hf}, \text{Zr}$ )”, *Materials Today Physics*, 1, 24-30, (2017).
8. Luo Yu, Haiqing Zhou, Jingying Sun, Fan Qin, Fang Yu, Jiming Bao, Ying Yu\*, **Shuo Chen\***, Zhifeng Ren\*, “Cu nanowires shelled with NiFe layered double hydroxide nanosheets as bifunctional electrocatalysts for overall water splitting”, *Energy Environ Sci* (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, Jiming Bao, “Bifunctional metal phosphide  $\text{FeMnP}$  films from single source metal organic chemical vapor deposition for

- efficient overall water splitting”, *Nano Energy*, (2017).
10. Haiqing Zhou, Fang Yu, Jingying Sun, Ran He, **Shuo Chen\***, Ching-Wu Chu\*, and Zhifeng Ren\*, “Highly active catalyst derived from a 3D foam of Fe(PO<sub>3</sub>)<sub>2</sub>/Ni<sub>2</sub>P for extremely efficient water oxidation”, *Proc. Natl. Acad. Sci.*, 114, 5607–5611, (2017).
  11. Haiqing Zhou, Fang Yu, Yuanyue Liu, Jingying Sun, Zhuan Zhu, Ran He, Jiming Bao, William A. Goddard, **Shuo Chen\***, and Zhifeng Ren\*, “Outstanding hydrogen evolution reaction catalyzed by porous nickel diselenide electrocatalysts”, *Energy Environ Sci*, 10, 1487-1492, (2017).
  12. Zuan-Tao Lin, Jianhua Gu, Chien-Hung Li, T. Randall Lee, Lixin Xie, **Shuo Chen**, Piao-Yang Cao, Shan Jiang, Yulin Yuan, Xia Hong, Hongting Wang, Dezhi Wang, Xifan Wang, Gang-Biao Jiang, Mikala Heon, Tianfu Wu, “A Nanoparticle-Decorated Biomolecule-Responsive Polymer Enables Robust Signaling Cascade for Biosensing”, *Adv. Mater.*, 1702090, (2017).
  13. Siya Huang, Lu Tang, Hasan Salehi Najafabadi, **Shuo Chen**, Zhifeng Ren, “A highly flexible semi-tubular carbon film for stable lithium metal anodes in high-performance batteries”, *Nano Energy*, 38, 504-509, (2017).
  14. Byeongyong Lee, Tianyuan Liu, Sun Kyung Kim, Hankwon Chang, Lixin Xie, Kwangsup Eomd, **Shuo Chen**, Hee Dong Jang, Seung Woo Lee, “Submicron silicon encapsulated with graphene and carbon as a scalable anode for lithium-ion batteries”, *Carbon*, 119, 438-445, (2017).
  15. Ze Yang, Yan Jiang, Liangzi Deng, Ting Wang, **Shuo Chen\***, and Yunhui Huang\*, “A high-voltage honeycomb-layered Na<sub>4</sub>NiTeO<sub>6</sub> as cathode material for Na-ion batteries”, *J. Power Sources*, 360, 319-323, (2017).
  16. Jingying Sun, Feng Wang, Yuan Liu, Yizhou Ni, Haiqing Zhou, Chuan Fei Guo\*, and **Shuo Chen\***, “Gold micromeshes as highly active electrocatalysts for methanol oxidation reaction”, *RSC Advances*, 7, 22479-22484 (2017).
  17. Emily M. Saad, Jingying Sun, **Shuo Chen**, Olaf J. Borkiewicz, Mengqiang Zhu, Owen W. Duckworth, and Yuanzhi Tang, “Siderophore and Organic Acid Promoted Dissolution and Transformation of Cr(III)-Fe(III)-(oxy)hydroxides”, *Environ. Sci. Technol.*, 51, 3223–3232, (2017).
  18. M. Yarali, J. Hao, M. Khodadadi, H. Brahmi, **Shuo Chen**, V. Hadjiev, Y. J. Jung and A. Mavrokefalos, “Physisorbed vs chemisorbed oxygen effect on thermoelectric properties of highly organized single wall carbon nanotube nanofilms”, *RSC Advances*, 7, 14078, (2017).
  19. Fang Yu, Haiqing Zhou, Zhuan Zhu, Jingying Sun, Ran He, Jiming Bao, **Shuo Chen\***, and Zhifeng Ren\*, “Three-Dimensional Nanoporous Iron Nitride Film as an Efficient Electrocatalyst for Water Oxidation”, *ACS Catal.*, 7, 2052–2057, (2017).
  20. Haiqing Zhou, Fang Yu, Jingying Sun, Hangtian Zhu, Ishwar Kumar Mishra, **Shuo Chen\***, and Zhifeng Ren\*, “Highly efficient hydrogen evolution from edge-oriented WS<sub>2</sub>(1-x)Se<sub>2x</sub> particles on three-dimensional porous NiSe<sub>2</sub> foam”, *Nano Lett.* 16, 7604-7609 (2016).
  21. Haiqing Zhou, Fang Yu, Yufeng Huang, Jingying Sun, Robert J. Nielsen, William A. Goddard III, **Shuo Chen\***, and Zhifeng Ren\*, “Efficient hydrogen evolution by ternary molybdenum sulfoselenide MoS<sub>2</sub>(1-x)Se<sub>2x</sub> particles on self-standing porous NiSe<sub>2</sub> foam”, *Nat. Commun.* 7, 12765 (2016).
  22. Haiqing Zhou, Fang Yu, Jingying Sun, Ran He, Yumei Wang, Chuanfei Guo, Feng Wang, Yucheng Lan, Zhifeng Ren\* and **Shuo Chen\***, “Highly active and durable self-standing WS<sub>2</sub>/graphene hybrid catalysts for hydrogen evolution reaction”, *J. Mater. Chem. A* 4, 9472-9476 (2016).
  23. Tianyuan Liu, Amir A. Bakhtiary, Davijani, Jingying Sun, **Shuo Chen**, Satish Kumar,

- Seung Woo Lee, “Hydrothermally Oxidized Single-Walled Carbon Nanotube Networks for High Volumetric Electrochemical Energy Storage”, *Small* 12, 3423-31 (2016).
24. Zhuang Zhu, Jiangtan Yuan, Haiqing Zhou, Jonathan Hu, Jing Zhang, Chengli Wei, Fang Yu, **Shuo Chen**, Yucheng Lan, Yao Yang, Yanan Wang, Chao Niu, Zhifeng Ren, Jun Lou, Zhiming Wang, Jiming Bao, “Excitonic Resonant Emission–Absorption of Surface Plasmons in Transition Metal Dichalcogenides for Chip-Level Electronic–Photonic Integrated Circuits”, *ACS Photonics*, 3, 869-874 (2016).
  25. Haiqing Zhou, Yumei Wang, Ran He, Fang Yu, Jingying Sun, Feng Wang, Yucheng Lan, Zhifeng Ren\*, and **Shuo Chen\***, “One-step synthesis of self-supported porous NiSe<sub>2</sub>/Ni hybrid foam: An efficient 3D electrode for hydrogen evolution reaction”, *Nano Energy* 20, 29-36 (2016).
  26. H Zhang, Y Wang, L Huang, **S Chen**, H Dahal, D Wang, Z Ren, “Synthesis and thermoelectric properties of n-type half-Heusler compound VCoSb with valence electron count of 19”, *Journal of Alloys and Compounds*, 654, 321-326 (2016).
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  28. Jing Shuai, Yumei Wang, Hee Seok Kim, Zihang Liu, Jingying Sun, **Shuo Chen**, Jiehe Sui, Zhifeng Ren, “Thermoelectric properties of Na-doped Zintl compound: Mg<sub>3-x</sub>Na<sub>x</sub>Sb<sub>2</sub>”, *Acta Materialia* 93, 187–193 (2015).
  29. Q An, Y Li, HD Yoo, **S Chen**, Q Ru, L Mai, Y Yao, “Graphene decorated vanadium oxide nanowire aerogel for long-cycle-life magnesium battery cathodes”, *Nano Energy* 18, 265-272 (2015).
  30. L Huang, R He, **S Chen**, H Zhang, K Dahal, H Zhou, H Wang, Q Zhang, Z Ren, “A new n-type half-Heusler thermoelectric material NbCoSb”, *Materials Research Bulletin* 70, 773-778 (2015).
  31. Jing Shuai, Hee Seok Kim, Yucheng Lan, **Shuo Chen**, Yuan Liu, Huaizhou Zhao, Jiehe Sui, and Zhifeng Ren, “Study on thermoelectric performance by Na doping in nanostructured Mg<sub>1-x</sub>Na<sub>x</sub>Ag<sub>0.97</sub>Sb<sub>0.99</sub>”, *Nano Energy* 11, 640-646 (2015).
  32. Ran He, Sonika Gahlawat, Chuanfei Guo, **Shuo Chen**, Tulashi Dahal, Hao Zhang, Weishu Liu, Qian Zhang, Eyob Chere, Kenneth White, Zhifeng Ren, “Studies on mechanical properties of thermoelectric materials by nanoindentation”, *Physica Status Solidi (a)* 212, 2191-2195 (2015).
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  34. Qian Zhang, Eyob Kebede Chere, Kenneth McEnaney, Mengliang Yao, Feng Cao, Yizhou Ni, **Shuo Chen**, Cyril Opeil, Gang Chen, Zhifeng Ren, “Enhancement of Thermoelectric Performance of n-Type PbSe by Cr Doping with Optimized Carrier Concentration”, *Advanced Energy Materials* 5, 1401977 (2015).
  35. Haiqing Zhou, Fang Yu, Chuan Fei Guo, Zongpeng Wang, Yucheng Lan, Gang Wang, Zheyu Fang, Yuan Liu, **Shuo Chen**, Lianfeng Sun, Zhifeng Ren, “Well-oriented epitaxial gold nanotriangles and bowties on MoS<sub>2</sub> for surface-enhanced Raman scattering”, *Nanoscale* 7, 9153-9157 (2015).
  36. Eyob K. Chere, Qian Zhanga, Kenneth McEnaney, Mengliang Yao, Feng Cao, Jingying Sun, **Shuo Chen**, Cyril Opeil, Gang Chen, Zhifeng Ren, “Enhancement of thermoelectric performance in n-type PbTe<sub>1-y</sub>Se<sub>y</sub> by doping Cr and tuning Te:Se ratio”, *Nano Energy* 13 355-367 (2015).

37. Hatem Brahmi, Giwan Katwal, Mohammad Khodadadi, **Shuo Chen**, Maggie Paulose, Oomman K Varghese, Anastassios Mavrokefalos, “Thermal-structural relationship of individual titania nanotubes”, *Nanoscale* 7, 19004-19011 (2015).
38. Weishu Liu, Hee Seok Kim, **Shuo Chen**, Qing Jie, Bing Lv, Mengliang Yao, Zhengsong Ren, Cyril P. Opeil, Stephen Wilson, Ching-Wu Chu, and Zhifeng Ren, “New n-type thermoelectric material  $\text{Mg}_2\text{Sn}_{0.75}\text{Ge}_{0.25}$  for high power generation”, *PNAS* 112, 3269-3274 (2015).
39. R. He, Hee Seok Kim, Yucheng Lan, Dezhi Wang, **Shuo Chen\*** and Zhifeng Ren\*, “Investigating the thermoelectric properties of p-type half-Heusler  $\text{Hf}_x(\text{ZrTi})_{1-x}\text{CoSb}_{0.8}\text{Sn}_{0.2}$  by reducing Hf concentration for power generation”, *RSC Adv.* 4, 64711 (2014).
40. S. Gahlawat, R. He, **S. Chen**, L. Wheeler, Z. F. Ren, and K. W. White, “Elastic constants determined by nanoindentation for p-type thermoelectric half-Heusler”, *J. Appl. Phys.* 116, 083516 (2014).
41. Tulashi Dahal, Qing Jie, Giri Joshi, **Shuo Chen**, Chuanfei Guo, Yucheng Lan, and Zhifeng Ren, “Thermoelectric Property Enhancement in Yb-Doped n-type Skutterudites  $\text{Yb}_x\text{Co}_4\text{Sb}_{12}$ ”, *Acta Mater.* 75, 316-321 (2014).
42. Weishu Liu, Chuan Fei Guo, Qian Zhang, Yucheng Lan, **Shuo Chen**, and Zhifeng Ren, “ $\text{Bi}_2\text{S}_3$  Nano Networks as Precursor for Improved Thermoelectric Performance”, *Nano Energy* 4, 113-122 (2014).
43. **Shuo Chen** and Zhifeng Ren, “Recent progress of half-Heusler for moderate temperature thermoelectric applications”, *Materials Today*, 16, 387-395 (2013).
44. **Shuo Chen**, Kevin C. Lukas, Weishu Liu, Cyril P. Opeil, Gang Chen, and Zhifeng Ren, “Effect of Hf concentration on thermoelectric properties of nanostructured n-type half Heusler materials  $\text{Hf}_x\text{Zr}_{1-x}\text{NiSn}_{0.99}\text{Sb}_{0.01}$ ”, *Adv. Energy Mater* 3, 1210-1214 (2013).
45. Xiao Yan, Weishu Liu, **Shuo Chen**, Hui Wang, Qian Zhang, Hengzhi Wang, Dezhi Wang, Gang Chen, and Zhifeng Ren, “Thermoelectric property study of nanostructured ternary p-type half-Heuslers  $(\text{HfZrTi})\text{CoSb}_{0.8}\text{Sn}_{0.2}$ ”, *Adv. Energy Mater* 3, 1195-1200 (2013).
46. G. Joshi, T. Dahal, **S. Chen**, H.Z. Wang, J. Shiomi, G. Chen and Z. F. Ren, “Enhancement of thermoelectric figure-of-merit at low temperatures by titanium substitution for hafnium in n-type half-Heuslers  $\text{Hf}_{0.75-x}\text{Ti}_x\text{Zr}_{0.25}\text{NiSn}_{0.99}\text{Sb}_{0.01}$ ”, *Nano Energy* 2, 82-87 (2013).
47. H. Z. Zhao, M. Pokharel, **S. Chen**, B. L. Liao, K. Lukas, C. Opeil, G. Chen and Z. F. Ren, “Figure-of-merit enhancement in nanostructured  $\text{FeSb}_{2-x}\text{Ag}_x$  with  $\text{Ag}_{1-y}\text{Sb}_y$  nanoinclusions”, *Nanotechnology* 23, 505402 (2012).
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51. Christopher E. Carlton, **Shuo Chen**, Paulo J. Ferreira, Lawrence F. Allard, and Yang Shao-Horn, “Sub-Nanometer-Resolution Elemental Mapping of “Pt<sub>3</sub>Co” Nanoparticle

- Catalyst Degradation in Proton-Exchange Membrane Fuel Cells”, *J. Phys. Chem. Lett.* 3, 161-166 (2012).
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  53. Qian Zhang, Qinyong Zhang, **Shuo Chen**, Weishu Liu, Kevin Lukas, Xiao Yan, Hengzhi Wang, Dezhi Wang, Cyril Opeil, Gang Chen, and Zhifeng Ren, “Suppression of grain growth by additive in nanostructured p-type bismuth antimony tellurides”, *Nano Energy* 1, 183-189 (2012).
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  60. H.P. Feng, B. Yu, **Shuo Chen**, K.C. Collins, C. He, Z.F. Ren, and G. Chen, “Studies on surface preparation and smoothness of nanostructured Bi<sub>2</sub>Te<sub>3</sub>-based alloys by electrochemical and mechanical methods”, *Electrochimica Acta*, 56, 3079-3084 (2011).
  61. Naoaki Yabuuchi, Yi-Chun Lu, Azzam N. Mansour, **Shuo Chen**, and Yang Shao-Horn, “The Influence of Heat-Treatment Temperature on the Cation Distribution of LiNi<sub>0.5</sub>Mn<sub>0.5</sub>O<sub>2</sub> and Its Rate Capability in Lithium Rechargeable Batteries”, *J. Electrochem. Soc.*, 158, A192 - A200 (2011).
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  65. Yi-Chun Lu, Zhichuan Xu, Hubert Gasteiger, **Shuo Chen**, Kimberly Hamad-Schifferli, and Yang Shao-Horn, “Platinum-gold nanoparticles: A highly active bifunctional electrocatalyst for rechargeable lithium-air batteries”, *J. Am. Chem. Soc.*, 132, 12170-12171 (2010).
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2. Zhifeng Ren, Jian Guo Wen, Jing Y. Lao, Wenzhi Li, and **Shuo Chen**, “Synthesis of boron carbide nanoparticles”, US Patent App. 11/088,527.
3. Zhifeng Ren, **Shuo Chen**, Wei-Shu Liu, Hengzhi Wang, Hui Wang, Bo Yu, and Gang Chen, “Methods of synthesizing thermoelectric materials”, US Patent 9,306,145.
4. Zhifeng Ren, Xiao Yan, Giri Joshi, **Shuo Chen**, Gang Chen, Bed Poudel, and James Christopher Caylor, “Half-heusler alloys with enhanced figure of merit and methods of making”, US Patent 9,048,004.

#### SELECTED PRESENTATIONS

1. **Shuo Chen**, “Layered transition metal oxide electrode materials for sodium-ion batteries”, XXVI International Materials Research Congress, Aug 20-25, 2017, Cancun, Mexico (*invited*).
2. **Shuo Chen**, “Nanostructured materials for energy conversion and storage”, College of Chemistry and Chemical Engineering, Central South University, May 26, 2017, Changsha, Hunan, China (*invited*).
3. **Shuo Chen**, “Novel nanostructured materials for electrochemical conversion and storage”, Department of Materials Science and Engineering, Harbin Institute of Technology Shenzhen Graduate School, May 22, 2017, Shenzhen, Guangdong, China (*invited*).
4. **Shuo Chen**, “Nanocomposite materials for energy conversion and storage”, Department of Mechanical and Automation Engineering at the Chinese University of Hong Kong, May. 18, 2017, Hong Kong, China (*invited*).

5. **Shuo Chen**, “Understanding materials for energy applications” , Nanomaterials speaker series, Mar. 10, 2017, Houston, TX, USA (*invited*).
6. **Shuo Chen**, “Noble Metal-Free Electrocatalysts for Water Electrolysis”, University of Wyoming, Feb. 10, 2017, Laramie, WY, USA (*invited*).
7. **Shuo Chen**, “Noble metal-free electrocatalysts for water electrolysis”, *Electronic Materials and Applications*, January 18-20, 2017, Orlando, FL, USA (*invited*).
8. **Shuo Chen**, “Efficient transition metal dichalcogenide electrocatalysts for water splitting”, James Madison University, Nov. 10, 2016, Harrisonburg, VA, USA (*invited*).
9. **Shuo Chen**, “Novel metal dichalcogenide electrocatalysts for water splitting”, South University of Science and Technology of China, Aug. 1, 2016, Guangzhou, Guangdong, China (*invited*).
10. Haiqing Zhou, Yumei Wang, Fang Yu, Zhifeng Ren, **Shuo Chen**, “One-Step Synthesis of Self-Supported Porous NiSe<sub>2</sub>/Ni Hybrid Foam: An Efficient 3D Electrode for Hydrogen Evolution Reaction”, *Materials Research Society Spring Meeting*, Mar. 28-Apr. 1, 2016, Phoenix, AZ, USA.
11. **Shuo Chen**, “Investigation of mechanical properties of thermoelectric materials by nanoindentation”, *Energy Materials Nanotechnology Meeting on Thermoelectric Materials*, Feb. 22-24, 2016, Orlando, FL, USA (*invited*).
12. **Shuo Chen**, “Nanocomposite Materials for Energy Harvesting: Thermoelectrics and Electrocatalysis”, Sep. 17, 2015, Rice University, Houston, TX, USA. (*invited*).
13. **Shuo Chen**, Jiantao Kong, Kevin Lukas, Weishu Liu, Cyril Opeil, Gang Chen, and Zhifeng Ren, “High performance MNiSn (M=Hf, Zr) based n-type half Heusler thermoelectric material”, *Materials Research Society Fall Meeting*, Nov. 25-30, 2012, Boston, MA, USA.
14. **Shuo Chen**, “Scanning transmission electron microscopy studies of highly active Pt-Co nanoparticles for proton exchange membrane fuel cells”, *International Workshop on Materials Behavior at the Micro- and Nano- Scale*, Jun. 8-11, 2010, Xi’an, Shaanxi, P. R. China (*invited*).
15. **Shuo Chen**, Hubert A. Gasteiger, Katsuichiro Hayakawa, Tomoyuki Tada, Yang Shao-Horn, “Platinum-cobalt cathode catalyst degradation in proton exchange membrane fuel cells: nano-scale transformations observed by high-resolution microscopy”, *Materials Research Society Fall Meeting*, Nov. 30-Dec. 4, 2009, Boston, MA, USA (*invited*).
16. **Shuo Chen**, Hubert A. Gasteiger, Katsuichiro Hayakawa, Tomoyuki Tada, and Yang Shao-Horn, “Platinum-alloy cathode catalyst degradation in proton exchange membrane fuel cells: nanometer-scale compositional and morphological changes”, *The 5th International Fuel Cell Workshop*, Aug. 23-24, 2009, Kofu, Yamanashi, Japan.
17. **Shuo Chen**, “Probing thermoelectric properties with *in situ* TEM”, *Workshop on Mechanical Behaviors of Micro/Nano Materials*, Dec. 30-31, 2008, Xi’an Jiaotong University, Xi’an, Shaanxi, P. R. China (*invited*).
18. **Shuo Chen**, J. Y. Huang, “*In situ* electron microscopy enabled by a TEM-SPM platform”, *American Vacuum Society 55<sup>th</sup> International Symposium and Exhibition*, Oct. 19-24, 2008, Boston, MA, USA (*invited*).
19. **Shuo Chen**, Paulo J. Ferreira, Larry Allard, Wenchao Sheng, Naoaki Yabuuchi, and Yang Shao-Horn, “Enhanced activity for oxygen reduction reaction on “Pt<sub>3</sub>Co” nanoparticles: Evidence of Pt skeleton and Pt segregation-sandwich structures at the

nanoscale”, *American Chemical Society Spring 2008 National Meeting*, Apr. 6-10, 2008, New Orleans, LA, USA.

20. **Shuo Chen**, P. J. Ferreira, Larry Allard, N. Yabuuchi, and Y. Shao-Horn, “Surface segregation in “Pt<sub>3</sub>Co” nanoparticles”, *Microscopy and Microanalysis Meeting*, Aug. 5-9, 2007, Fort Lauderdale, FL, USA.
21. **Shuo Chen**, J. Y. Huang, S. H. Jo, Z. Q. Wang, D. X. Han, G. Chen, M. S. Dresselhaus, and Z. F. Ren, “Electrical conducting and breakdown behaviors of multiwall carbon nanotubes under different contact modes”, *American Physical Society March Meeting*, Mar. 13-17, 2006, Baltimore, MD, USA.
22. **Shuo Chen**, J. Y. Huang, S. H. Jo, Z. Q. Wang, K. Kempa, G. Chen, M.S. Dresselhaus, and Z. F. Ren “High-bias induced structure and electronic property changes in carbon nanotubes”, *Materials Research Society Fall Meeting*, Nov. 27-Dec. 1, 2005, Boston, MA, USA.
23. **Shuo Chen**, B. Klotz, M. Koslowske, D. Z. Wang, J. Y. Huang, R. Dowding, and Z. F. Ren, “Property studies of plasma pressure compacted B<sub>4</sub>C-CNTs nanocomposites”, *Materials Research Society Fall Meeting*, Nov. 29-Dec. 3, 2004, Boston, MA, USA.
24. **Shuo Chen**, D. Z. Wang, J. Y. Huang, and Z. F. Ren, “Synthesis and characterizations of uniformly sized boron carbide nanoparticles”, *American Physical Society March Meeting*, Mar. 22-26, 2004, Montreal, Quebec, Canada.
25. **Shuo Chen**, D. Z. Wang, J. Y. Lao, J. Y. Huang, and Z. F. Ren “Functionalization of carbon nanotubes with boron carbide nanolumps”, *Materials Research Society Fall Meeting*, Nov. 30-Dec. 5, 2003, Boston, MA, USA.

## SERVICE

- Session chair for *XXVI International Materials Research*, September 20-25, 2017, Cancun, Mexico.
- Symposium organizer for *Electronic Materials and Applications*, January 18-20, 2017, Orlando, FL, USA
- Session chair for *Electronic Materials and Applications*, January 18-20, 2017, Orlando, FL, USA
- Proposal reviewer for: ACS Petroleum Research Fund, Department of Energy, European Research Area, Israel Science Foundation, National Science Foundation.
- Reviewer for: *Energy and Environmental Science*, *Fuel Cells*, *Inorganic Chemistry*, *Journal of Colloid and Interface Science*, *Journal of the American Chemical Society*, *Journal of Heat Transfer*, *Journal of Nanomaterials*, *Journal of the American Ceramic Society*, *Journal of the Electrochemical Society*, *Journal of Solid State Science and Technology*, *Nuclear Engineering and Technology*, *Physical Chemistry Chemical Physics*
- Participant in various outreach activities, such as Houston area STEM Festival, Girls Exploring Math and Science Event, Houston Energy Day, etc.

## TEACHING

- Lecturer for calculus-based University Physics I and II.
- Lecturer for upper-level Physics undergraduate courses: Thermal Physics; Electronic Devices and Their Applications.
- Lecturer for STEM Teaching Equity Project, a high school teacher training program.