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RESEARCH INTERESTS

High performance thermoelectric materials and devices: nanostructure approach to reduce thermal conductivity and to improve thermoelectric properties, waste heat conversion into electricity; ***Solar photovoltaic energy conversion***: nano approaches for photovoltaic energy conversion; ***Mechanics of carbon nanotubes and other nanowires, and nanocomposites***: the deformation and mechanical properties of carbon nanotubes and other nanowires by high resolution transmission electron microscope; ***Bio agent delivery and bio sensors*:** carbon nanotubes spearing for molecular delivery into cells with high viability, nano cavities for sensitive bio sensing.

EDUCATION

Postdoctoral Fellow, Condensed Matter Physics, SUNY at Buffalo, Buffalo, NY, USA	90-92
Ph.D., Condensed Matter Physics, Chinese Academy of Sciences, Beijing, China	87-90
M.S., Mechnical Engineering, Huazhong University of Science and Technology, Wuhan, China	84-87
B.S., Mechanical Engineering, Sichuan Institute of Technology, Chengdu, China	80-84

SELECTED HONORS/AWARDS:

Fellow of the American Physical Society	2004
Fellow of the American Association for the Advancement of Science	2005
Outstanding Overseas Chinese Young Investigator, Nanjing University, China	2005
Distinguished Senior Research Award of Boston College	2006
R&D 100 Award for the development of high performance thermoelectric materials	2008
Changjiang Visiting Professorship, Nanjing University, China	2009
Guangdong Province Inaugural Leadership Awardee	2010
Thousand Talent Program Awardee, China	2010
Ranked as the 49th of the world's top 100 Materials Scientists of the decade 2000-2010	2011
Fellow of the National Academy of Inventors	2013
2014 Recipient of the Edith and Peter O'Donnell Award in Science from The Academy of Medicine, Engineering & Science of Texas (TAMEST)	2014

PROFESSIONAL ACTIVITIES

Editorial Board, "Journal of Materials Science & Surface Engineering (JMSSE)", 2013-now
Regional Editor, "Current Bionanotechnology", 2013-2014
Editorial Board, "Dataset Papers in Nanotechnology", 2012-now
Editorial Board, "Journal of Surface Engineered Materials and Advanced Technology", 2012-now
Editorial Board, "Progress in Physics", 2009-now
Editorial Advisory Board, "Recent Patents on Nanotechnology", 2007-now
Proposal Review Committee for the Center of Nanophase Materials Science of the Oak Ridge National Laboratory, 2007-now
Wuxi New District International Advisory & Consultative Committee, 2009-2010
Original Organizing Committee for establishing the School of Engineering and Applied Sciences, Nanjing University, 2009-2010
Co-Founder of NanoLab, Inc. in 2000, *commercialization of carbon nanotubes*
Co-Founder of Solasta, Inc. in 2006, *commercialization of highly efficient solar cells*

Co-Founder of GMZ Energy, Inc. in 2006, *commercialization of high ZT thermoelectric materials*
Board of directors for GMZ Energy China, 2011-now

PROFESSIONAL EXPERIENCE

2013-now ***M. D. Anderson Chair Professor***, Physics and TcSUH, also in Mechanical Engineering (effective 2/28/2013), Biology and Biochemistry (effective 3/18/2013), Chemistry (effective 9/1/2013), Electrical and Computer Engineering (7/18/2014), University of Houston
Directing postdocs, visiting scholars, PhD students working on energy science and technologies funded by DOE, DOD, and industries.

2004-2013 ***Professor***, Physics, Boston College
Had a group of postdocs, visiting scholars, PhD students, undergraduates, and high school students working on energy science funded by DOE, NSF, DOD, etc.

1999-2004 ***Associate Professor***, Physics, Boston College
Established a materials laboratory with a variety of synthesis and characterization equipment including plasma enhanced chemical vapor deposition, hot press, magnetron sputtering, XRD, SEM, HRTEM, etc.

1998-1999 ***Research Associate Professor***, Chemistry, SUNY at Buffalo
Initiated pioneering work on carbon nanotubes and superconducting materials funded by NSF, DOE, and ARO.

1995-1998 ***Research Assistant Professor***, Chemistry, SUNY at Buffalo
Produced high J_c long superconducting tapes of (Tl,Bi)-1223 on RABiTS; studied a model superconductor $Tl_2Ba_2CuO_{6+\delta}$ for d-wave paring symmetry with Drs. C. Tsuei and J. Kirtley at IBM and interlayer coupling effect with Prof. D. van der Marel in The Netherland.

1992-1995 ***Research Scientist/Lecturer***, Chemistry, SUNY at Buffalo
Laser ablation and magnetron sputtering for high quality epitaxial (Tl,Bi)-1223 films.

1990-1992 ***Postdoctoral Research Associate***, Chemistry, SUNY at Buffalo
Investigated the relationship between superconducting properties and processing parameters in Tl-based systems; fabricated the first high-J_c ($>10^4$ A/cm^2) long-length (>20 m) (Tl,Pb)-1223 superconducting tape.

1987-1990 ***Research Assistant***, Institute of Physics, Chinese Academy of Sciences
Growth and properties of single crystals $YBa_2Cu_3O_{7-\delta}$ and $Bi_2Sr_2Ca_{n-1}Cu_nO_{2n+4}$.

1984-1987 ***Research and Teaching Assistant***, Mechanical Engineering, Huazhong University of Sciences and Technology
Solid-solid and solid-liquid phase transitions, solidification of eutectic alloys, and crystal morphological transformations of eutectic Al-Cu alloy.

Member: Materials Research Society; American Physical Society, The American Association for the Advancement of Science; American Energy Society; and International ***Who's Who*** of Professionals.

Reviewer: Journals: *Science, Nature Materials, Nature Nanotechology, Appl. Phys. Lett., NanoLetters, Advanced Materials, Angewandte Chemie, Journal of American Chemical Society, Small, Nanotechnology, Physica C, etc.*
Proposals: *DOE, NSF, NASA, U.S. Civilian Research and Development Foundation (CRDF), Engineering and Physical Sciences Research Council (UK), etc.*

Patents:

1. Z. F. Ren, Z. P. Huang, J. H. Wang, and D. Z. Wang, "Free-Standing and Aligned Carbon Nanotubes and Synthesis Thereof", US 6,863,942 B2, issued on Mar 8, 2005.
2. R. Schlaf, Z. F. Ren, J. G. Wen, and D. L. Carnahan, "Method of Producing a Branched Carbon Nanotube for Use with an Atomic Force Microscope", US 6,871,528 B2, issued on Mar 29, 2005.
3. Z. F. Ren, J. G. Wen, J. Y. Lao, and W. Z. Li, "Reinforced Carbon Nanotubes", US 6,911,260 B2, issued on June 28, 2005.
4. S. O. Kelley, J. Fourkas, M. J. Naughton, and Z. F. Ren, "DNA-Bridged Carbon Nanotubes Arrays", US 6,958,216 B2, issued on Oct 25, 2005.
5. Z. F. Ren, J. G. Wen, J. H. Chen, Z. P. Huang, and D. Z. Wang, "Coated Carbon Nanotube Array Electrodes", US 7,147,966 B2, issued on Dec 12, 2006.
6. W. Z. Li, J. G. Wen, and Z. F. Ren, "Varied Morphology Carbon Nanotubes and Methods for Their Manufacture", US 7,157,068 B2, issued on Jan 2, 2007.
7. Z. F. Ren, G. Chen, B. Poudel, S. Kumar, W. Z. Wang, and M. S. Dresselhaus, "Methods for Synthesis of Semiconductor Nanocrystals and Thermoelectric Composites", US 7,255,846 B2, issued on Aug 14, 2007.
8. Z. F. Ren, J. Y. Lao, and D. Banerjee, "Metal Oxide Nanostructures with Hierachical Morphology", US 7,294,417 B2, issued on Nov 13, 2007.
9. Z. F. Ren, J. G. Wen, J. H. Chen, Z. P. Huang, and D. Z. Wang, "Coated Carbon Nanotube Array Electrodes", US 7,442,284 B2, issued on Oct 28, 2008.
10. Z. F. Ren, J. G. Wen, J. Y. Lao, and W. Z. Li, "Reinforced Carbon Nanotubes", US 7,442,414 B2, issued on Oct 28, 2008.
11. Z. F. Ren, Y. H. Lin, W. Yantasee, G. D. Liu, F. Lu, and Y. Tu, "Carbon Nanotube Nanoelectrode Arrays", US 7,452,452 B2, issued on Nov 18, 2008.
12. Z. F. Ren, and Y. Tu, "Density Controlled Carbon Nanotube Array Electrodes", US 7,465,494 B2, issued on Dec 16, 2008.
13. G. Chen, Z. F. Ren, and M. S. Dresselhaus, "Nanocomposites with High Thermoelectric Figures of Merit", US 7,465,871 B2, issued on Dec 16, 2008.
14. Z. F. Ren, G. Chen, B. Poudel, S. Kumar, W. Z. Wang, and M. S. Dresselhaus, "Doped Semiconductor Nanoparticles and Methods of Synthesis Thereof", US 7,586,033 B2, issued on Sept 8, 2009.
15. K. Kempa, M. J. Naughton, Z. F. Ren, and J. A. Rybczynski, "Apparatus and Methods for Manipulating Light Using Nanoscale Cometal Structures", US 7,589,880 B2, issued on Sep 15, 2009.
16. Z. F. Ren, S. Kumar, G. Chen, and H. Lee, "Thermoelectric Properties by High Temperature Annealing", US 7,591,913 B2, issued on Sept 22, 2009.
17. M. Naughton, K. Kempa, and Z. F. Ren, "Nanoscale Optical Microscope", US 7,623,746 B2, issued on Nov 24, 2009.
18. K. Kempa, M. J. Naughton, Z. F. Ren, and J. A. Rybczynski, "Apparatus and Methods for Nanolithography Using Nanoscale Optics", US 7,634,162 B2, issued on Dec 15, 2009.
19. K. Kempa, Z. F. Ren, M. J. Naughton, and J. A. Rybczynski, "Appratus and methods for optical switching using nanoscale optics", US 7,649,665 B2, issued on Jan 19, 2010.

20. Z. F. Ren, S. H. Jo, and D. Banerjee, "Device and Method for Achieving Enhanced Field Emission Utilizing Nanostructures Grown on a Conductive Substrate", US 7,666,051 B2, issued on Feb 23, 2010.
21. K. Kempa, M. J. Naughton, Z. F. Ren, Y. Wang, and J. A. Rybczynski, "Apparatus and Methods for Solar Energy Conversion Using Nanocoax Structures", US 7,754,964 B2, issued on July 13, 2010.
22. K. Kempa, M. J. Naughton, Z. F. Ren, and J. A. Rybczynski, "Apparatus and Methods for Solar Energy Conversion Using Nanoscale Cometal Structures", US 7,943,847 B2, issued on May 17, 2011.
23. G. Chen, X. Y. Chen, M. Dresselhaus, and Z. F. Ren, "Solar Thermoelectric Conversion", US 8,168,879 B2, issued on May 1, 2012.
24. G. Chen, Z. F. Ren, and M. S. Dresselhaus, "Nanocomposites with High Thermoelectric Figures of Merit", US 8,293,168, issued on October 23, 2012.
25. G. Chen and Z. F. Ren, "Solar thermoelectric hot water system", Chinese ZL200880025371.8, issued on Feburary 27, 2013.
26. G. Chen, Z. F. Ren, and M. S. Dresselhaus, "Nanocomposites with High Thermoelectric Figures of Merit", Japanese patent 5253810, issued on April 26, 2013.
27. Z. F. Ren, G. Chen, D. Z. Wang, M. Dresselhaus, X. Yan, X. W. Wang, B. Yu, B. Poudel, Y. C. Lan, Q, Hao, Y. Ma, X. Y. Chen, and G. Joshi "Methods fro High Figure-of-merit in Nanostructured Thermoelectric Materilas", Japanese patent 5329423, issued on August 2, 2013.
28. G. Chen, X. Y. Chen, M. Dresselhaus, and Z. F. Ren, "Solar Thermoelectric Conversion", Japanese patent 536332/09, issued on November 26, 2013.

Publications

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PUBLICATIONS IN PEER-REFEREED JOURNALS

2014

318. Zhen Yang, Liangzi Deng, Yucheng Lan, Xiaoliu Zhang, Zhonghong Gao, Ching-Wu Chu, Dong Cai, and Zhifeng Ren, "Molecular extraction in single live cells by sneaking in and out magnetic nanomaterials", *PNAS* (2014).
317. Tianyi Sun, Chuan Fei Guo, Feng Cao, Eser Metin Akinoglu, Yang Wang, Michael Giersig, Zhifeng Ren, and Krzysztof Kempa, "A Broadband Solar Absorber with 12 nm Thick Ultrathin *a*-Si Layer by Using Random Metallic Nanomeshes", *Applied Physics Letter*, (2014).
316. Shaowei Song, Jueling Wang, Bo Xu, Xiaobo Lei, Hongchuan Jiang, Yingrong Jin, Qinyong Zhang, and Zhifeng Ren, "Thermoelectric properties of n-type $Bi_2Te_{2.7}Se_{0.3}$ with addition of nano-ZnO: Al particles", *Materials Research Express*, (2014).
315. Tulashi Dahal, Qing Jie, Giri Joshi, Shuo Chen, Chuanfei Guo, Yucheng Lan, and Zhifeng Ren, "Thermoelectric Property Enhancement in Yb-Doped n-type Skutterudites $Yb_xCo_4Sb_{12}$", *Acta Materialia* **75**, 316-321 (2014).
314. M. Pokharel, H. Z. Zhao, M. Koirala, Z. F. Ren, and C. Opeil, "Enhanced Thermoelectric Performance of Te-doped $FeSb_2$ Nanocomposite", *J Low Temp Phys* **176**, 122-130 (2014).
313. Mani Pokharel, Tulashi Dahal, Zhifeng Ren, and Cyril Opeil, "Thermoelectric properties of nanocomposite heavy fermion $CeCu_6$", *Journal of Alloys and Compounds* **609**, 228-232 (2014).
312. Chuan Fei Guo, Yucheng Lan, Tianyi Sun, and Zhifeng Ren, "Deformation-induced cold-welding for self-healing of super-durable flexible transparent electrodes", *Nano Energy* **8**, 110-117 (2014).
311. A. J. Hong, L. Li, H. X. Zhu, X. H. Zhou, Q. Y. He, W. S. Liu, Z. B. Yan, J.-M. Liu, Zhifeng Ren, "Anomalous transport and thermoelectric performances of CuAgSe compounds", *Solid State Ionics* **261**, 21-25 (2014).
310. Huaizhou Zhao, Jiehe Sui, Zhongjia Tang, Yucheng Lan, Qing Jie, Daniel Kraemer, Kenneth McEnaney, Arnold Guloy, Gang Chen, and Zhifeng Ren, "High thermoelectric performance of MgAgSb-based materials", *Nano Energy* **7**, 97-103 (2014).
309. Chuan Fei Guo, Tianyi Sun, Feng Cao, Qian Liu, and Zhifeng Ren, "Metallic nanostructures for light trapping in energy harvesting devices", *Light: Science & Applications* **3**, e161 (2014).
308. Chuan Fei Guo, Tianyi Sun, Qihan Liu, Zhigang Suo, and Zhifeng Ren, "Highly stretchable and transparent nanomesh electrodes made by grain boundary lithography", *Nature Communications* **5**, 4121 (2014).
307. M. H. Qin, S. Dong, H. B. Zhao, Y. Wang, J. -M. Liu, and Zhifeng Ren, "Magnetic orders in pnictide superconductors: effect of biquadratic interaction", *New Journal of Physics* **16**, 053027 (2014).
306. Feng Cao, Kenneth McEnaney, Gang Chen, and Zhifeng Ren, "Review on Cermets-based Spectrally Selective Solar Absorbers", *Energy and Environmental Science* **7**, 1615-1627 (2014).

305. Weishu Liu, Chuan Fei Guo, Qian Zhang, Yucheng Lan, Shuo Chen, and Zhifeng Ren, "Bi_2S_3 Nano Networks as Precursor for Improved Thermoelectric Performance", *Nano Energy* **4**, 113-122 (2014).
304. Bing Han, Ke Pei, Yuanlin Huang, Xiaojian Zhang, Qikun Rong, Qinggeng Lin, Yangfei Guo, Tianyi Sun, Chuanfei Guo, David Carnahan, Michael Giersig, Yang Wang, Jinwei Gao, Zhifeng Ren, and Krzysztof Kempa, "Uniform self-forming metallic network as a high performance transparent conductive electrode", *Adv. Mater.* **26**, 873-877 (2014).
303. Longb Liao, Qiuhui Zhang, Zhihua Su, Zhongzheng Zhao, Yanan Wang, Yang Li, Xiaoxiang Lu, Dongguang Wei, Guoying Feng, Qingkai Yu, Xiaojun Cai, Jimin Zhao, Zhifeng Ren, Hui Fang, Francisco Robles Hernandez, Steven Baldelli, and Jiming Bao, "High-efficiency solar water splitting using a nanocrystalline CoO photocatalyst", *Nature Nanotechnology* **9**, 69-73 (2014).
302. J. J. Feng, L. Huo, W. C. Huang, Y. Wang, M. H. Qin, J.-M. Liu, and Zhifeng Ren, "The main 1/2 magnetization plateau in Shastry-Sutherland magnets: Effect of the long-range Ruderman-Kittel-Kasuya-Yosida interaction", *EPL* **105**, 17009 (2014).
301. V. G. Hadjiev, M. N. Iliev, B. Lv, Z. F. Ren, and C. W. Chu, "Anomalous Vibrational Properties of Cubic Boron Arsenide", *PRB* **89**, 024308 (2014).

2013

300. Shuo Chen and Zhifeng Ren, "Recent progress of half-Heusler for moderate temperature thermoelectric applications", *Materials Today* **16**, 387-395 (2013).
299. Gaohua Zhu, Weishu Liu, Yucheng Lan, Giri Joshi, Hui Wang, Gang Chen, and Zhifeng Ren, "The Effect of Secondary Phase on Thermoelectric Properties of Zn_4Sb_3 Compound", *Nano Energy* **2**, 1172-1178 2013 (2013).
298. Q. Zhang, Y. C. Lan, S. L. Yang, F. Cao, M. L. Yao, C. Opeil, D. Broido, G. Chen, Z. F. Ren, "Increased thermoelectric performance by Cl dopant in nanostructured $AgPb_{18}SbSe_{20}$", *Nano Energy* **2**, 1121-1127 (2013).
297. Eser Metin Akinoglu, Tianyi Sun, Jinwei Gao, Michael Giersig, Zhifeng Ren, and Krzysztof Kempa, "Evidence for critical scaling of plasmonic modes at the percolation threshold in metallic nanostructures", *Appl. Phys. Lett*. **103**, 171106 (2013).
296. Weishu Liu, Hengzhi Wang, Lijuan Wang, Xiaowei Wang, Giri Joshi, Gang Chen, and Zhifeng Ren, "Understanding of the contact of nanostructured thermoelectric n-type $Bi_2Te_{2.7}Se_{0.3}$ legs for power generation applications", *J. Mater. Chem. A* **1**, 13093-13100 (2013).
295. Yucheng Lan, Yalin Lu, Zhifeng Ren, "Mini Review on Photocatalysis of Titanium Dioxide Nanoparticles and Their Solar Applications", *Nano Energy* **2**, 1031-1045 (2013).
294. Shuo Chen, Kevin Lukas, Wei-shu Liu, Cyril Opeil, Gang Chen, and Zhifeng Ren, "Effect of Hf concentration on thermoelectric properties of nanostructured n-type half Heusler materials $Hf_xZr_{1-x}NiSn_{0.99}Sb_{0.01}$", *Advanced Energy Materials* **3**, 1210-1214 (2013).
293. Xiao Yan, Weishu Liu, Shuo Chen, Hui Wang, Qian Zhang, Gang Chen, and Zhifeng Ren, "Thermoelectric property study of nanostructured p-type half-Heuslers (Hf, Zr, Ti)$CoSb_{0.8}Sn_{0.2}$", *Advanced Energy Materials* **3**, 1195-1200 (2013).
292. Yucheng Lan, Hui Wang, Feng Lin, Yalin Lu, Yang Li, Yuan Liu, Jiming Bao, Zhifeng Ren, and Martin Crimp, "Nanoporous gallium nitride square microtubes", *J Mater Sci* **48**, 7703-7707 (2013).

291. Qinyong Zhang, Siqi Yang, Qian Zhang, Shuo Chen, Weishu Liu, Hui Wang, Zhiting Tian, David Broido, Gang Chen, and Zhifeng Ren, "Effect of aluminum on the thermoelectric properties of nanostructured PbTe", *Nanotechnology* **24**, 345705 (2013).
290. Qian Zhang, Bolin Liao, Yucheng Lan, Kevin Lukas, Weishu Liu, Keivan Esfarjani, Cyril Opeil, David Broido, Gang Chen, and Zhifeng Ren, "High thermoelectric performance by resonant doping of indium in nanostructured SnTe", *PNAS* **110**, 13261-13266 (2013).
289. Patrick J. Taylor, Jay R. Maddux, Greg Meissner, Rama Venkatasubramanian, Gary Bulman, Jonathan Pierce, Rahul Gupta, Jim Bierschenk, Chris Caylor, Jonathan D'Angelo, and Zhifeng Ren, "Controlled improvement in specific contact resistivity for thermoelectric materials by ion implantation", *Applied Physics Letters* **103**, 043902 (2013).
288. Chuan Fei Guo, Tianyi Sun, Yang Wang, Jinwei Gao, Qian Liu, Krzysztof Kempa, and Zhifeng Ren, "Conductive black silicon surface made by silver nano-network assisted etching", *Small* **9**, 2415-2419 (2013).
287. Mani Pokharel, Huaizhou Zhao, Zhifeng Ren, and Cyril Opeil, "Grain boundary Kapitza resistance analysis of nanostructured $FeSb_2$", *International Journal of Thermal Sciences* **71**, 32-35 (2013).
286. Machhindra Koirala, Huaizhou Zhao, Mani Pokharel, Shuo Chen, Tulashi Dahal, Cyril Opeil, Gang Chen, and Zhifeng Ren, "Thermoelectric Property Enhancement by Cu Nanoparticles in Nanostructured $FeSb_2$", *Appl. Phys. Lett*. **102**, 213111 (2013).
285. Qing Jie, Hengzhi Wang, Weishu Liu, Hui Wang, Gang Chen, and Zhifeng Ren "Fast Phase Formation of Double-Filled p-type Skutterudite by Ball-milling and Hot-pressing", *Physical Chemistry Chemical Physics* **15**, 6809-6816 (2013).
284. Mani Pokharel, Huaizhou Zhao, Kevin Lukas, Zhifeng Ren, and Cyril Opeil, "Phonon drag effect in nanocomposite $FeSb_2$", *MRS Communications* **3**, 31-36 (2013).
283. Shien-Ping Feng, Ya-Huei Chang, Jian Yang, Bed Poudel, Bo Yu, Zhifeng Ren, and Gang Chen, "Reliable Contact Fabrication on Nanostructured Bi_2Te_3-Based Thermoelectric Materials", *Physical Chemistry Chemical Physics* **15**, 6757-6762 (2013).
282. Ting Zhang, Jun Jiang, Yukun Xiao, Yongbiao Zhai, Shenghui Yang, Gaojie Xu, and Zhifeng Ren, "Effect of dehydrated-attapulgite nanoinclusions on the thermoelectric properties of BiSbTe alloys", *RSC Advances* **3**, 4951-4953 (2013).
281. Jinwei Gao, Ke Pei, Tianyi Sun, Yaohui Wang, Linghai Zhang, Weijin Peng, Qinggeng Lin, Michael Giersig, Krzysztof Kempa, Zhifeng Ren, and Yang Wang, "Transparent Nanowire Network Electrode for Textured Semiconductors", *Small* **9**, 733-737 (2013).
280. Tianyi Sun, Eser Metin Akinoglu, Chuanfei Guo, Trilochan Paudel, Jinwei Gao, Yang Wang, Michael Giersig, Zhifeng Ren, and Krzysztof Kempa, "Enhanced broad-band extraordinary optical transmission through subwavelength perforated metallic films on strongly polarizable substrates", *Applied Physics Letters* **102**, 101114 (2013).
279. Andrew Muto, Jian Yang, Bed Poudel, Zhifeng Ren, and Gang Chen, "Skutterudite unicouple characterization for energy harvesting applications", *Advanced Energy Materials* **3**, 245-251 (2013).
278. Weishu Liu, Kevin Lukas, Kenneth McEnaney, Sangyeop Lee, Qian Zhang, Cyril Opeil, Gang Chen, and Zhifeng Ren, "Studies on the Bi_2Te_3–Bi_2Se_3–Bi_2S_3 system for mid-temperature thermoelectric energy conversion", *Energy & Environmental Science* **6**, 552-560 (2013).

277. A. Khorsand Zak, W. H. abd. Majid, H. Z. Wang, Ramin Yousefi, A. Moradi Golsheikh, Z. F. Ren, "Sonochemical synthesis of hierarchical ZnO nanostructures", *Ultrason. Sonochem.* **20,** 395-400 (2013).
276. G. Joshi, T. Dahal, S. Chen, H. Z. Wang, 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 $Hf_{0.75-x}Ti_xZr_{0.25}NiSn_{0.99}Sb_{0.01}$", *Nano Energy* **2**, 82-87 (2013).

2012

275. Hui Wang, Yucheng Lan, Jiaming Zhang, M. A. Crimp, and Zhifeng Ren, "Growth mechanism and elemental distribution of beta-Ga_2O_3 crystalline nanowires synthesized by cobalt-assisted chemical vapor deposition", *J. of Nanoscience and Nanotechnology* **12**, 3101-3107 (2012).
274. Chetan Dhital, D. L. Abernathy, Gaohua Zhu, Z. F. Ren, D. Broido, and Stephen D. Wilson, "Inelastic neutron scattering study of phonon density of states in nanostructured $Si_{1-x}Ge_x$ thermoelectrics", *PRB* **86**, 214303 (2012).
273. Huaizhou Zhao, Mani Pokharel, Shuo Chen, Bolin Liao, Kevin Lukas, Hui Wang, Cyril Opeil, Gang Chen, and Zhifeng Ren, "Figure-of-Merit Enhancement in Nanostructured $FeSb_{2-x}Ag_x$ with Nanoinclusions $Ag_{1-y}Sb_y$", *Nanotechnology* **23**, 505402 (2012).
272. K. C. Lukas, W. S. Liu, Q. Jie, Z. F. Ren, C. P. Opeil, "Thermal Stability of Thermoelectric Materials via In Situ Resistivity Measurements", *Rev. Sci. Instrum.* **83**, 115114 (2012).
271. Chris E. Carlton, Chris A. Kuryak, Wei-shu Liu, Zhifeng Ren, Gang Chen, and Yang Shao-Horn, "Disordered stoichiometric nanorods and ordered off-stoichiometric nanoparticles in n-type thermoelectric $Bi_2Te_{2.7}Se_{0.3}$", *J. Appl. Phys.* **112**, 093518 (2012).
270. Maria N. Luckyanova, Jivtesh Garg, Keivan Esfarjani, Adam Jandl, Mayank T. Bulsara, Aaron J. Schmidt, Austin J. Minnich, Shuo Chen, Mildred S. Dresselhaus, Z. F. Ren, Eugene A. Fitzgerald, Gang Chen, "Coherent Phonon Heat Conduction in Superlattices", *Science* **338**, 936-939 (2012).
269. Qian Zhang, Feng Cao, Kevin Lukas, Weishu Liu, Keivan Esfarjani, Cyril Opeil, David Broido, David Parker, David J. Singh, Gang Chen, and Zhifeng Ren, "Study of the thermoelectric properties of lead selenide doped with boron, gallium, indium, or thallium". *JACS* **134**, 17731-17738 (2012).
268. K. C. Lukas, W. S. Liu, Z. F. Ren, and C. P. Opeil, "Transport properties of Ni, Co, Fe, Mn doped $Cu_{0.01}Bi_2Te_{2.7}Se_{0.3}$ for thermoelectric device applications", *J. Appl. Phys*. **112**, 054509 (2012).
267. Mona Zebarjadi, Jian Yang, Kevin Lukas, Boris Kozinsky, Bo Yu, Mildred S. Dresselhaus, Cyril Opeil, Zhifeng Ren, and Gang Chen, "Role of phonon dispersion in studying phonon mean free paths in skutterudites", *J. Appl. Phys*. **112**, 044305 (2012).
266. Qian Zhang, Feng Cao, Weishu Liu, Kevin Lukas, Bo Yu, Shuo Chen, Cyril Opeil, Gang Chen, and Zhifeng Ren, "Heavy doping and band engineering by potassium to improve thermoelectric figure-of-merit in p-type PbTe, PbSe, and $PbTe_{1-y}Se_y$", *JACS* **134**, 10031-10038 (2012).
265. David Parker, David J. Singh, Qinyong Zhang, and Zhifeng Ren, "Thermoelectric properties of n-type PbSe revisited", *J. Appl. Phys*. **111**, 123701 (2012).

264. Piotr Patoka, Tianyi Sun, Michael Giersig, Zhifeng Ren, and Krzysztof Kempa, "Nanoribbon Plasmonic Gratings and their Anomalous Interaction with Electromagnetic Waves", *Adv. Mater.* **24**, 3042–3045 (2012).
263. Hui Wang, Yucheng Lan, Martin A. Crimp, C. L. Lin, Nitin Shukla, Taofang Zeng, Dezhi Wang, Kecheng Li, Zhifeng Ren, Gang Chen, "Paramagnetic microspheres with core–shelled structures", *J. Mater. Sci.* **47**, 5946-5954 (2012).
262. Xiao Yan, Weishu Liu, Hui Wang, Shuo Chen, Junichiro Shiomi, Keivan Esfarjani, Hengzhi Wang, Dezhi Wang, Gang Chen, and Zhifeng Ren, "Stronger phonon scattering by larger differences in atomic mass and size in p-type half-Heuslers $Hf_{1-x}Ti_xCoSb_{0.8}Sn_{0.2}$", *Energy and Environmental Science* **5**, 7543-7548 (2012).
261. K. C. Lukas, G. Joshi, K. Modic, Z. F. Ren, and C. P. Opeil, "Thermoelectric properties of Ho-doped $Bi_{0.88}Sb_{0.12}$", *J. Mater. Sci.* **47**, 5729-5734 (2012).
260. Qinyong Zhang, Hengzhi Wang, Qian Zhang, Weishu Liu, Bo Yu, Hui Wang, Dezhi Wang, George Ni, Gang Chen, and Zhifeng Ren, "Effect of silicon and sodium on thermoelectric properties of thallium doped lead telluride based materials", *NanoLetters* **12**, 2324-2330 (2012).
259. K. C. Lukas, W. S. Liu, G. Joshi, M. Zebarjadi, M. S. Dresselhaus, Z. F. Ren, G. Chen, and C. P. Opeil, "Experimental determination of the Lorenz number in $Cu_{0.01}Bi_2Te_{2.7}Se_{0.3}$ and $Bi_{0.88}Sb_{0.12}$", *Phys. Rev. B* **85**, 205410 (2012).
258. Huaizhou Zhao, Binod Rizal, Gregory McMahon, Hengzhi Wang, Pashupati Dhakal, Timothy Kirkpatrick, Zhifeng Ren, Thomas C. Chiles, Michael J. Naughton, and Dong Cai, "Ultrasensitive Chemical Detection Using a Nanocoax Sensor", *ACS Nano* **6**, 3171-3178 (2012).
257. Bo Yu, Weishu Liu, Shuo Chen, Hui Wang, Hengzhi Wang, Gang Chen, and Zhifeng Ren, "Thermoelectric properties of copper selenide with ordered selenium layer and disordered Cu layer", *Nano Energy* **1**, 472-478 (2012).
256. H. L. Gao, T. J. Zhu, H. Wang, Z. F. Ren, and X. B. Zhao, "Study on the effect of Pb partial substitution for Te on the thermoelectric properties of $La_3Te_{4-x}Pb_x$ materials", *J. Phys. D: Appl. Phys.* **45**, 185303 (2012).
255. Bo Yu, Mona Zebarjadi, Hui Wang, Kevin Lukas, Hengzhi Wang, Dezhi Wang, Cyril Opeil, Mildred Dresselhaus, Gang Chen, and Zhifeng Ren, "Enhancement of thermoelectric properties by modulation-doping in silicon germanium alloy nanocomposites", *NanoLetters* **12**, 2077-2082 (2012).
254. Yumin Ye, Yu Mao, Hengzhi Wang, and Zhifeng Ren, "Hybrid structure of pH-responsive hydrogel and carbon nanotube array with superwettability", *J. Mater. Chem*. **22**, 2449-2455 (2012).
253. O. Delaire, M. B. Stone, J. Ma, A. Huq, D. Gout, C. Brown, K. F. Wang, and Z. F. Ren, "Anharmonic phonons and magnons in $BiFeO_3$", *Phys. Rev. B* **85**, 064405 (2012).
252. Yang Wang, Tianyi Sun, Trilochan Paudel, Yi Zhang, Zhifeng Ren, and Krzysztof Kempa, "Metamaterial-Plasmonic Absorber Structure for High Efficiency Amorphous Silicon Solar Cells", *NanoLetters* **12**, 440 – 445 (2012).
251. 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).

250. Weishu Liu, Xiao Yan, Gang Chen, and Zhifeng Ren, "Recent advances in thermoelectric nanocomposites", *Nano Energy* **1**, 42-56 (2012).
249. Qinyong Zhang, Hui Wang, Weishu Liu, Hengzhi Wang, Bo Yu, Qian Zhang, Zhiting Tian, George Ni, Sangyeop Lee, Keivan Esfarjani, Gang Chen, and Zhifeng Ren, "Enhancement of thermoelectric figure-of-merit by resonant states of aluminium doping in lead selenide", *Energy & Environmental Science* **5**, 5246-5251 (2012).
248. M. Zebarjadi, K. Esfarjani, M. S. Dresselhaus, Z. F. Ren, and G. Chen, "Perspectives on Thermoelectrics: from fundamentals to device applications", *Energy & Environmental Science* **5**, 5147-5162 (2012).

2011

247. Hengzhi Wang, Qingjun Cai, Chung-Lung Chen, Dezhi Wang, and Zhifeng Ren, "Growth of Aligned Carbon Nanotubes on ALD-Al_2O_3 Coated Silicon and Quartz Substrates", *Journal of Experimental Nanoscience* **6**, 464 – 472 (2011).
246. Kenneth McEnaney, Daniel Kraemer, Zhifeng Ren, and Gang Chen, "Modeling of concentrating solar thermoelectric generators", *Journal of Appl. Phys*. **110**, 074502 (2011).
245. Chetan Dhital, Clarina de la Cruz, C. Opeil, A. Treat, K. F. Wang, J.-M. Liu, Z. F. Ren, and Stephen D. Wilson, "Neutron scattering study of magnetic phase separation in nanocrystalline $La_{5/8}Ca_{3/8}MnO_3$", *Phys. Rev. B* **84**, 144401 (2011).
244. Huaizhou Zhao, Mani Pokheral, Gaohua Zhu, Shuo Chen, Kevin Lukas, Qing Jie, Cyril Opeil1, Gang Chen, and Zhifeng Ren, "Dramatic Thermal Conductivity Reduction by Nanostructures for Large Increase in Thermoelectric Figure-of-Merit of $FeSb_2$", *Applied Physics Letters* **99**, 163101 (2011).
243. Hengzhi Wang and Z. F. Ren, "The evolution of carbon nanotubes during their growth by plasma enhanced chemical vapor deposition", *Nanotechnology* **22**, 405601 (2011).
242. Yucheng Lan, Yang Wang, and Zhifeng Ren, "Physics and Applications of Aligned Carbon Nanotubes", *Advances in Physics* **60**, 553 – 678 (2011).
241. Feng-Jia Fan, Bo Yu, Yi-Xiu Wang, Yan-Long Zhu, Xiao-Jing Liu, Shu-Hong Yu, and Zhifeng Ren, "Colloidal Synthesis of $Cu_2CdSnSe_4$ Nanocrystals and Hot-Pressing to Enhance the Thermoelectric Figure-of-Merit", *JACS* **133**, 15910-15913 (2011).
240. Giri Joshi, Xiao Yan, Hengzhi Wang, W. S. Liu, Gang Chen, and Z. F. Ren, "Enhancement in thermoelectric figure-of-merit of n-type half-Heusler compound by nanocomposite approach", *Advanced Energy Materials* **1**, 643 – 647 (2011).
239. W. S. Liu, Q. Y. Zhang, Y. C. Lan, Shuo Chen, Xiao Yan, Qian Zhang, Hui Wang, D. Z. Wang, Gang Chen, and Z. F. Ren, "Thermoelectric property studies on Cu doped n-type $Cu_xBi_2Te_{2.7}Se_{0.3}$ nanocomposites", *Advanced Energy Materials* **1**, 577 – 587 (2011).
238. J. M. Bao, I. Shalish, Z. H. Su, R. Gurwitz, F. Capasso, X. W. Wang, and Z. F. Ren, "Photoinduced oxygen release and persistent photoconductivity in ZnO nanowires", *Nanoscale Research Letters* **6**, 404 (2011).
237. D. Kraemer, B. Poudel, H.-P. Feng, J. C. Caylor, B. Yu, X. Yan, Y. Ma, X. W. Wang, D. Z. Wang, A. Muto, K. McEnaney, Q. Hao, M. Chiesa, Z. F. Ren, and G. Chen, "High-performance solar thermoelectric generators with flat-panel thermal concentration", *Nature Materials* **10**, 532 – 538 (2011).
236. Mona Zebarjadi, Giri Joshi, Gaohua Zhu, Bo Yu, Austin Minnich, Yucheng Lan, Xiaowei Wang, Mildred Dresselhaus, Zhifeng Ren, and Gang Chen, "Power factor enhancement by modulation doping in bulk nanocomposites", *NanoLetters* **11**, 2225 – 2230 (2011).

235. Hsien-Ping Feng, Trilochan Paudel, Bo Yu, Shuo Chen, Z. F. Ren, and Gang Chen, "Nanoparticle-Enabled Selective Electrodeposition", *Adv. Mater.* **23** 2454 – 2459 (2011).
234. H. Z. Wang, Q. Y. Zhang, B. Yu, H. Wang, W. S. Liu, G. Chen, and Z. F. Ren, "TEM study of Pb-depleted discs in PbTe-based alloys", *J. Materials Research* **26**, 912 – 916 (2011).
233. T. Paudel, J. Rybczynski, Y. T. Gao, Y. C. Lan, Y. Peng, K. Kempa, M. J. Naughton, and Z. F. Ren, "Nanocoax solar cells based on aligned multiwalled carbon nanotube arrays", *Phys. Status Solidi A* **208**, 924 – 927 (2011).
232. Y. Q. Zhang, M. S. Dresselhaus, Y. Shi, Z. F. Ren, and G. Chen, "High thermoelectric figure-of-merit in Kondo-insulator nanowires at low temperatures", *NanoLetters* **11**, 1166 – 1170 (2011).
231. G. H. Zhu, Y. C. Lan, H. Wang, G. Joshi, Q. Hao, G. Chen, and Z. F. Ren, "Effect of selenium deficiency on the thermoelectric properties of *n*-type In_4Se_{3-x} compounds", *Phys. Rev. B* **83**, 115201 (2011).
230. H. P. Feng, Bo Yu, Shuo Chen, K. Collins, Chao He, Z. F. Ren, and Gang Chen, "Studies on surface preparation and smoothness of nanostructured Bi_2Te_3-based alloys by electrochemical and mechanical methods", *Electrochimica Acta* **56**, 3079 – 3084 (2011).
229. X. Yan, G. Joshi, W. S. Liu, Y. C. Lan, H. Wang, S. Lee, J. W. Simonson, S. J. Poon, T. M. Tritt, G. Chen, and Z. F. Ren, "Enhanced Thermoelectric Figure-of-Merit of p-Type Half-Heuslers", *NanoLetters* **11**, 556 – 560 (2011).
228. N. Zhang, S. Dong, G. Q. Zhang, L. Lin, Y. Y. Guo, J. –M. Liu, and Z. F. Ren, "Multiferroic phase diagram of Y partially substituted $Dy_{1-x}Y_xMnO_3$", *Appl. Phys. Lett*. **98**, 012510 (2011).

2010

227. Y. C. Lan, Hui Wang, Dezhi Wang, Gang Chen, and Z. F. Ren, "Grids for Applications in High-Temperature High-Resolution Transmission Electron Microscopy", *Journal of Nanotechnology* **2010**, 279608 (2010).
226. Mona Zebarjadi, Keivan Esfarjani, Jian Yang, Z. F. Ren, and Gang Chen, "Effect of filler mass and binding on thermal conductivity of fully filled skutterudites", *Phys. Rev. B* **82**, 195207 (2010).
225. Xiao Yan, Bed Poudel, Yi Ma, W. S. Liu, G. Joshi, Hui Wang, Yucheng Lan, Dezhi Wang, Gang Chen, and Z. F. Ren, "Experimental Studies on Anisotropic Thermoelectric Properties and Structures of n-type $Bi_2Te_{2.7}Se_{0.3}$", *NanoLetters* **10**, 3373 – 3378 (2010).
224. Q. Hao, G. H. Zhu, G. Joshi, X. W. Wang, A. Minnich, Z. F. Ren, and G. Chen, "Theoretical studies on the thermoelectric figure of merit of nanograined bulk silicon", *Appl. Phys. Lett*. **97**, 063109 (2010).
223. D. Cai, L. Ren, H. Z. Zhao, C. J. Xu, Y. Yu, H. Z. Wang, Y. C. Lan, M. Roberts, M. J. Naughton, Z. F. Ren, and T. Chiles, "A molecular imprint nanosensor for ultrasensitive detection of proteins", *Nature Nanotechnology* **5**, 597 – 601 (2010).
222. Y. Peng, T. Paudel, W. C. Chen, W. J. Padilla, Z. F. Ren, and K. Kempa, "Percolation and polaritonic effects in periodic planar nanostructures evolving from holes to islands", *Appl. Phys. Lett.* **97**, 041901 (2010).

221. Ruiting Zheng, Jinwei Gao, Tengfei Yang, Yucheng Lan, Guoan Cheng, Dezhi Wang, Z. F. Ren, and Gang Chen, "Na_2SO_4 Monocrystal Nanowires; Aspect Ratio Control and Electron Beam Radiolysis", *Inorg. Chem*. **49**, 6748 – 6754 (2010).
220. B. Yu, Q. Y. Zhang, H. Wang, X. W. Wang, H. Z. Wang, D. Z. Wang, H. Wang, G. J. Snyder, G. Chen, and Z. F. Ren, "Thermoelectric property studies on thallium-doped lead telluride prepared by ball milling and hot pressing", *J. of Appl. Phys*. **108**, 016104 (2010).
219. M. J. Naughton, K. Kempa, Z. F. Ren, Y. Gao, J. Rybczynski, N. Argenti, W. Gao, Y. Wang, Y. Peng, J. R. Naughton, G. McMahon, T. Paudel, Y. C. Lan, M. J. Burns, A. Shepard, M. Clary, C. Ballif, F.-J. Haug, T. Söderström, O. Cubero, and C. Eminian, "Efficient nanocoax-based solar cells", *Phys. Status Solidi RRL* **4**, 181– 183 (2010).
218. Hohyun Lee, Daryoosh Vashaee, D. Z. Wang, Mildred S. Dresselhaus, Z. F. Ren, and Gang Chen, "Effects of nanoscale porosity on thermoelectric properties of SiGe", *J. Apply. Phys*. **107**, 094308 (2010).
217. Jianhui Dong, Baoqing Zeng, Yucheng Lan, Shikai Tian, Yun Shan, Xingchong Liu, Zhonghai Yang, Hui Wang, and Z. F. Ren, "Field Emission from Few-Layer Graphene Nanosheets Produced by Liquid Phase Exfoliation of Graphite", *Journal of Nanoscience and Nanotechnology* **10**, 5051 – 5055 (2010).
216. H. Z. Wang, Z. P. Huang, Q. J. Cai, K. Kulkarni, C. -L. Chen, D. Carnahan, and Z. F. Ren "Reversible Transformation of Hydrophobicity and Hydrophilicity of Aligned Carbon Nanotubes Arrays and Buckypapers by Dry Processes", *Carbon* **48**, 868 – 875 (2010).
215. Y. C. Lan, A. J. Minnich, G. Chen, and Z. F. Ren, "Thermoelectric Figure-of-Merit Enhancement Using A Nanocomposite Approach", *Adv. Func. Mater.* **20**, 357 – 376 (2010).

2009

214. Y. C. Lan, H. Wang, X. Y. Chen, D. Z. Wang, G. Chen, and Z. F. Ren, "Nanothermometer Using Single Crystal Silver Nanospheres", *Adv. Mater*. **21**, 4839 – 4844 (2009).
213. K. Kempa, M. J. Naughton, Z. F. Ren, A. Herczynski, T. Kirkpatrick, J. Rybczynski, and Y. Gao, "Hot electron effect in nanoscopically thin photovoltaic junctions", *Appl. Phys. Lett*. **95**, 233121 (2009).
212. A. J. Minnich, H. Lee, X. W. Wang, G. Joshi, M. S. Dresselhaus, Z. F. Ren, G. Chen, and D. Vashaee, "Modeling study of thermoelectric SiGe nanocomposites", *Phys. Rev. B* **80**, 155327 (2009).
211. J. Yang, Q. Hao, H. Wang, Y. C. Lan, Q. Y. He, A. J. Minnich, D. Z. Wang, J. A. Harriman, V. M. Varki, M. S. Dresselhaus, G. Chen, and Z. F. Ren, "Solubility Study of Yb in n-type Skutterudites $Yb_xCo_4Sb_{12}$ and Their Enhanced Thermoelectric Properties", *Phys. Rev. B* **80**, 115329 (2009).
210. A. Muto, D. Kraemer, Q. Hao, Z. F. Ren, and G. Chen, "Thermoelectric Properties and Efficiency Measurements under Large Temperature Differences", *Rev. Sci. Instrum.* **80**, 093901 (2009).
209. K. F. Wang, J. M. Liu, and Z. F. Ren, "Multiferroicity: the Coupling between Magnetic and Polarization Orders", *Advances in Physics* **58**, 321 – 448 (2009).
208. G. H. Zhu, H. Lee, Y. C. Lan, X. W. Wang, G. Joshi, D. Z. Wang, J. Yang, D. Vashaee, H. Guilbert, A. Pillitteri, M. S. Dresselhaus, G. Chen, Z. F. Ren, "Increased Phonon Scattering

by Nanograins and Point Defects in Nanostructured Silicon with a Low Concentration of Germanium", *Phys. Rev. Lett*. **102**, 196803 (2009).

207. A. J. Minnich, M. S. Dresselhaus, Z. F. Ren, and G. Chen, "Bulk Nanostructured Thermoelectric Materials: Current Research and Future Prospects", *Energy & Environmental Science* **2**, 466 – 479 (2009).
206. Y. C. Lan, B. Poudel, Y. Ma, D. Z. Wang, M. S. Dresselhaus, G. Chen, and Z. F. Ren, "Structure Study of Bulk Nanograined Thermoelectric Bismuth Antimony Telluride" *NanoLetters* **9**, 1419 – 1422 (2009).
205. Y. Yu, A. Cimeno, Y. C. Lan, J. Rybczynski, D. Z. Wang, T. Paudel, Z. F. Ren, D. J. Wagner, M. Q. Qiu, T. C. Chiles, and D. Cai, "Assembly of multi-functional nanocomponents on periodic nanotube array for biosensors", *Micro & Nano Letters* **4**, 27 – 33 (2009).

2008

204. Giri Joshi, Hohyun Lee, Yucheng Lan, Xiaowei Wang, Gaohua Zhu, Dezhi Wang, Ryan W. Gould, Diana C. Cuff, Ming Y. Tang, Mildred S. Dresselhaus, Gang Chen, and Z. F. Ren, "Enhanced thermoelectric figure–of–merit in nanostructured p–type silicon germanium bulk alloys" *NanoLetters* **8**, 4670 – 4674 (2008).
203. X. W. Wang, H. Lee, Y. C. Lan, G. H. Zhu, G. Joshi, D. Z. Wang, J. Yang, A. J. Muto, M. Y. Tang, J. Klatsky, S. Y. Song, M. S. Dresselhaus, G. Chen, and Z. F. Ren, "Enhanced thermoelectric figure-of-merit in nanostructured n-type silicon germanium bulk alloy", *Appl. Phys. Lett*. **93**, 193121 (2008).
202. H. S. Cho, D. L. Shi, Y. Guo, J. Lian, Z. F. Ren, B. Poudel, Y. Song, J. L. Abot, D. Singh, J. Routbort, L. M. Wang, and R. C. Ewing "Enhanced Thermal Stability of Carbon Nanotubes by Plasma Surface Modification in Al_2O_3 Composites", *J. of Applied Physics* **104**, 074302 (2008).
201. Jessica Campos-Delgado, Jose Manuel Romo-Herrera, Xiaoting Jia, David A. Cullen, Hiroyuki Muramatsu, Yoong Ahm Kim, Takuya Hayashi, Z. F. Ren, David J. Smith, Yu Okuno, Tomonori Ohba, Hirofumi Kanoh, Katsumi Kaneko, Morinobu Endo, Humberto Terrones, Mildred S. Dresselhaus, and Mauricio Terrones, "Bulk Production of a New Form of sp^2 Carbon: Crystalline Graphene Nanoribbons", *NanoLetters* **8**, 2773 – 2778 (2008).
200. Yi Ma, Qing Hao, Bed Poudel, Yucheng Lan, Bo Yu, Dezhi Wang, Gang Chen, and Z. F. Ren "Enhanced Thermoelectric Figure-of-Merit in p-Type Nanostructured Bismuth Antimony Tellurium Alloys Made from Elemental Chunks", *NanoLetters* **8**, 2580 – 2584 (2008).
199. Qinyu He, Shejun Hu, Xingui Tang, Yucheng Lan, Jian Yang, Xiaowei Wang, Z. F. Ren, Qing Hao, and Gang Chen, "The great improvement effect of pores on ZT in $Co_{1-x}Ni_xSb_3$ system", *Appl. Phys. Lett*. **93**, 042108 (2008).
198. Qinyu He, Qing Hao, Xiaowei Wang, Jian Yang, Yucheng Lan, Xiao Yan, Bo Yu, Yi Ma, Bed Poudel, Giri Joshi, Dezhi Wang, Gang Chen, and Z. F. Ren, "Nanostructured thermoelectric skutterudite $Co_{1-x}Ni_xSb_3$ alloys", *J. Nanosci. Nanotechnol*. **8**, 4003 – 4006 (2008).
197. Dong Cai, Derek Blair, Fay J. Dufort, Maria R. Gumina, Zhongping Huang, George Hong, Dean Wagner, D. Canahan, K. Kempa, Z. F. Ren, and Thomas C. Chiles, "Interaction

between carbon nanotube and mammalian cell: characterization by flow cytometry and applications", *Nanotechnology* **19**, 345102 (2008).

196. C. L. Lu, K. F. Wang, S. Dong, J. G. Wan, J.-M. Liu, and Z. F. Ren, "Specific heat anomalies and possible Griffiths-like phase in $La_{0.4}Ca_{0.6}MnO_3$ nanoparticles", *J. of Appl. Phys.* **103**, 07F714 (2008).
195. J. Garg, B. Poudel, M. Chiesa, J. B. Gordon, J. J. Ma, J. B. Wang, Z. F. Ren, Y. T. Kang, H. Ohtani, J. Nanda, G. H. McKinley, and G. Chen, "Enhanced thermal conductivity and viscosity of copper nanoparticles in ethylene glycol nanofluid", *J. of Appl. Phys.* **103**, 074301 (2008).
194. Bed Poudel, Qing Hao, Yi Ma, Yucheng Lan, Austin Minnich, Bo Yu, Xiao Yan, Dezhi Wang, Andrew Muto, Daryoosh Vashaee, Xiaoyuan Chen, Junming Liu, Mildred S. Dresselhaus, Gang Chen, and Zhifeng Ren, "High-Thermoelectric Performance of Nanostructured Bismuth Antimony Telluride Bulk Alloys", *Science* **320**, 634 – 638 (2008).
193. Y. C. Lan, D. Z. Wang, G. Chen, and Z. F. Ren, "Diffusion of Nickel and Tin in p-type $(Bi,Sb)_2Te_3$ and n-type $Bi_2(Te,Se)_3$ Thermoelectric Materials", *Appl. Phys. Lett*. **92**, 101910 (2008).
192. W. Z. Wang, Xiao Yan, Bed Poudel, Yi Ma, Qing Hao, Jian Yang, Gang Chen, and Z. F. Ren, "Chemical Synthesis of Anistropic Nanocrystalline Sb_2Te_3 and Low Thermal Conductivity of the Compacted Dense Bulk", *J. Nanosci. Nanotechnol.* **8**, 452 – 456 (2008).
191. K. Kempa, X. Wang, Z. F. Ren, and M. J. Naughton, "Discretely guided electromagnetic effective medium", *Appl. Phys. Lett*. **92**, 043114 (2008).

2007

190. Dong Cai, Ying Yu, Yucheng Lan, Fay J. Dufort, Guangyong Xiong, Trilochan Paudel, Zhifeng Ren, Dean J. Wagner, and Thomas C. Chiles, "Glucose sensors made of novel carbon nanotube-gold nanoparticle composites", *Biofactors* **30**, 271 – 277 (2007).
189. Ganhua Lu, Liying Zhu, Pengxiang Wang, Junhong Chen, D. A. Dikin, R. S. Ruoff, Ying Yu, and Z. F. Ren, "Electrostatic-Force-Directed Assembly of Ag Nanocrystals onto Vertically Aligned Carbon Nanotubes", *J. Phys. Chem. C* **111**, 17919 – 17922 (2007).
188. Yan Guo, Hoonsung Cho, Donglu Shi, Jie Lian, Yi Song, Jandro Abot, Bed Poudel, Z. F. Ren, Lumin Wang, and Rodney C. Ewing, "Effects of plasma surface modification on interfacial behaviors and mechanical properties of carbon nanotube-Al_2O_3 nanocomposites", *Appl. Phys. Lett*. **91**, 261903 (2007).
187. W. Z. Li, X. Yan, K. Kempa, Z. F. Ren, and M. Giersig, "Structure of flattened carbon nanotubes", *Carbon* **45**, 2938 – 2945 (2007).
186. C. Dames, S. Chen, C. T. Harris, J. Y. Huang, Z. F. Ren, M. S. Dresselhaus, and G. Chen, "A hot wire probe for thermal measurements of nanowires and nanotubes inside a transmission electron microscope", *Rev. Sci. Instrum.* **78**, 104903 (2007).
185. F. Gao, Xinyi Chen, Kuibo Yin, Shuai Dong, Z. F. Ren, Fang Yuan, Tao Yu, Zhigang Zou, and Jun-Ming Liu, "Visible-Light Photocatalytic Properties of Weak Magnetic $BiFeO_3$ Nanoparticles", *Adv. Mater*. **19**, 2889 – 2892 (2007).
184. F. Gao, P. L. Li, Y. Y. Weng, S. Dong, L. F. Wang, L. Y. Lv, K. F. Wang, and J.-M. Liu, and Z. F. Ren, "Charge order suppression and weak ferromagnetism in $La_{1/3}Sr_{2/3}FeO_3$ nanoparticles", *Appl. Phys. Lett*. **91**, 072504 (2007).

183. Dong Cai, Cheryl A. Doughty, Terra B. Potocky, Fay J. Dufort, Zhongping Huang, Derek Blair, Krzysztof Kempa, Z. F. Ren, and Thomas C Chiles, "Carbon nanotube-mediated delivery of nucleic acids does not result in non-specific activation of B lymphocytes", *Nanotechnology* **18**, 365101 (2007).
182. Qinyu He, Qing Hao, Gang Chen, Bed Poudel, Xiaowei Wang, Dezhi Wang, and Z. F. Ren "Thermoelectric property studies on bulk TiO_x with x from 1 to 2", *Appl. Phys. Lett*. **91**, 052505 (2007).
181. P. L. Li, X. Y. Yao, F. Gao, C. Zhao, K. B. Yin, Y. Y. Weng, J.-M. Liu, and Z. F. Ren, "Preparation of aligned $Ca_3Co_2O_6$ nanorods and their steplike magnetization", *Appl. Phys. Lett.* **91**, 042505 (2007).
180. Chuan-Hua Chen, Qingjun Cai, Chialun Tsai, Chung-Lung Chen, Guangyong Xiong, Ying Yu, and Z. F. Ren, "Dropwise Condensation on Superhydrophobic Surfaces with Two-Tier Roughness", *Appl. Phys. Lett*. **90**, 173108 (2007).
179. J. Y. Huang, S. Chen, Z. F. Ren, Z. Wang, K. Kempa, M. J. Naughton, G. Chen, and M. S. Dresselhaus, "Enhanced Ductile Behavior of Tensile-Elongated Individual Double-Walled and Triple-Walled Carbon Nanotubes at High Temperatures", *Phys. Rev. Lett*. **98**, 185501 (2007).
178. M. S. Dresselhaus, G. Chen, M. Y. Tang, R. G. Yang, H. Lee, D. Z. Wang, Z. F. Ren, J. P. Fleurial, and P. Gogna, "New Directions for Low Dimensional Thermoelectric Materials", *Adv. Mater*. **19**, 1043 – 1053 (2007).
177. S. Dong, F. Gao, Z. Q. Wang, J.-M. Liu, and Z. F. Ren, "Surface phase separation in nanosized charge-ordered manganites", *Appl. Phys. Lett*. **90**, 082508 (2007).
176. Krzysztof Kempa, Jakub Rybczynski, Zhongping Huang, Keith Gregorczyk, Andy Vidan, Brian Kimball, Joel Carlson, Glynda Benham, Yang Wang, Andrzej Herczynski, and Z. F. Ren, "Carbon nanotubes as optical antennae", *Adv. Mater*. **19**, 421 – 426 (2007).
175. Baoqing Zeng, Guangyong Xiong, Shuo Chen, Wenzhong Wang, D. Z. Wang, and Z. F. Ren, "Field emission of silicon nanowires grown on carbon cloth", *Appl. Phys. Lett.* **90**, 033112 (2007).
174. Wenzhong Wang, Keda Wang, Daxing Han, Bed Poudel, Xiaowei Wang, D. Z. Wang, Baoqing Zeng, and Z. F. Ren, "Near-Infrared Photoluminescence in Germanium Oxide Enclosed Germanium Nano- and Micro-Crystals", *Nanotechnology* **18**, 075707 (2007).
173. J. Rybczynski, K. Kempa, Z. P. Huang, R. Jarzebinska, M. Giersig, A. Vidan, B. Kimball, J. Carlson, A. Herczynski, Y. Wang, M. J. Naughton, and Z. F. Ren, "Subwavelength waveguide for visible light", *Appl. Phys. Lett.* **90**, 021104 (2007).
172. Z. F. Ren, "Nanotube Synthesis: Cloning Carbon", *News and Views* in *Nature Nanotechnology* **2**, 17 – 18 (2007).

2006

171. Wenzhong Wang, Bed Poudel, Yi Ma, and Z. F. Ren, "Shape Control of Single Crystalline Bismuth Nanostructures", *J. of Phys. Chem. B*, **110**, 25702 – 25706 (2006).
170. Wenzhong Wang, Baoqing Zeng, Jian Yang, Bed Poudel, J. Y. Huang, M. J. Naughton, and Z. F. Ren, "Aligned Ultralong ZnO Nanobelts and Their Enhanced Field Emission", *Adv. Mater.* **18**, 3275 – 3278 (2006).

169. K. F. Wang, F. Yuan , S. Dong , D. Li , Z. D. Zhang , Z. F. Ren , and J. M. Liu, "A-site disorder induced collapse of charge-ordered state and phase separated phase in manganites", *Appl. Phys. Lett*. **89**, 222505 (2006).
168. Baoqing Zeng, Guangyong Xiong, Shuo Chen, W. Z. Wang, D. Z. Wang, and Z. F. Ren, "Enhancement of field emission of aligned carbon nanotubes by thermal oxidation", *Appl. Phys. Lett*. **89**, 223119 (2006).
167. F. Gao, Y. Yuan, K. F. Wang, X. Y. Chen, F. Chen, J.-M. Liu, and Z. F. Ren "Preparation and photoabsorption characterization of $BiFeO_3$ nanowires", *Appl. Phys. Lett*. **89**, 102506 (2006).
166. J. Y. Huang, S. Chen, Z. F. Ren, Z. Q. Wang, D. Z. Wang, M. Vaziri, Z. Suo, G. Chen, and M. S. Dresselhaus, "Kink Formation and Motion in Carbon Nanotubes at High Temperatures", *Phys. Rev. Lett*. **97**, 075501 (2006).
165. J. Y. Huang, S. Chen, Z. F. Ren, G. Chen, and M. S. Dresselhaus, "Real time observation of tubule formation from amorphous carbon nanowires under high-bias Joule heating", *NanoLetters* **6**, 1699 – 1705 (2006).
164. Jiming Bao, Mariano A. Zimmler, Federico Capasso, Xiaowei Wang, and Z. F. Ren, "Broadband ZnO single-nanowire light-emitting diode", *NanoLetters* **6**, 1719 – 1722 (2006).
163. Jian Yang, Wenzhong Wang, Yi Ma, D. Z. Wang, Z. F. Ren, D. Steeves, and B. Kimball, "High throughput growth of zinc oxide nanowires from zinc powder with the assistance of sodium chloride", *J. Nanosci. Nanotechnol.* **6**, 2196 – 2199 (2006).
162. Baoqing Zeng, Guangyong Xiong, Shuo Chen, S. H. Jo, W. Z. Wang, D. Z. Wang, and Z. F. Ren, "Field emission of silicon nanowires", *Appl. Phys. Lett*. **88**, 213108 (2006).
161. J. Rybczynski, K. Kempa, Y. Wang, Z. F. Ren, J. B. Carlson, B. R. Kimball, and G. Benham, "Visible light diffraction studies on periodically aligned arrays of carbon nanotubes: experimental and theoretical comparison", *Appl. Phys. Lett*. **88**, 203122 (2006).
160. K. F. Wang, Y. Wang, L. F. Wang, S. Dong, H. Yu, Q. C. Li, J. –M. Liu, and Z. F. Ren "Ferromagnetic metal to cluster-glass insulator transition induced by A-site disorder in manganites", *Appl. Phys. Lett*. **88**, 152505 (2006).
159. B. Poudel, W. Z. Wang, D. Z. Wang, J. Y. Huang, and Z. F. Ren, "Shape evolution of lead telluride and selenide nanostructures under different hydrothermal synthesis conditions", *J. Nanosci. Nanotechnol.* **6**, 1050 – 1053 (2006).
158. J. Y. Huang, S. Chen, Z. Q. Wang, K. Kempa, Y. M. Wang, S. H. Jo, G. Chen, M. S. Dresselhaus, and Z. F. Ren, "Superplastic carbon nanotubes", *Nature* **439**, 281 (2006).
157. Guangyong Xiong, D. Z. Wang, and Z. F. Ren, "Aligned millimeter-long carbon nanotubes arrays grown on single crystal magnesia", *Carbon* **44**, 969 – 973 (2006).
156. Y. Wang, S. H. Jo, S. Chen, D. Z. Wang, K. Kempa and Z. F. Ren, "Aligned carbon nanofibers by a low-energy dark discharge for field emission and optoelectronics", *Nanotechnology* **17**, 501 – 505 (2006).

2005

155. T. Kempa, D. Carnahan, M. Olek, M. Correa, M. Giersig, M. Cross, G. Benham, M. Sennett, Z. F. Ren, and K. Kempa, "Dielectric media based on isolated metallic nanostructures", *J. Appl. Phys*. 98, 034310 (2005).

154. S. Chen, J. Y. Huang, Z. Wang, K. Kempa, G. Chen, and Z. F. Ren, "High-bias-induced structure and the corresponding electronic property changes in carbon nanotubes", *Appl. Phys. Lett*. **87**, 263107 (2005).
153. Wenzhong Wang, Bed Poudel, D. Z. Wang, and Z. F. Ren, "Synthesis of multiwalled carbon nanotubes through a modified Wolff-Kishner reduction process", *J. of American Chemical Society* **127**, 18018 – 18019 (2005).
152. S. H. Jo, J. Y. Huang, S. Chen, G. Y. Xiong, D. Z. Wang, and Z. F. Ren, "Field emission of carbon nanotubes grown on carbon cloth", *J. of Vac. Sci. Technol. B* **23**, 2363 – 2368, (2005).
151. F. Chen, H. W. Liu, K. F. Wang, H. Yu, S. Dong, X. Y. Chen, X. P. Jiang, Z. F. Ren, and J-M Liu, "Synthesis and characterization of $La_{0.825}Sr_{0.175}MnO_3$ nanowires", *J. Phys.: Condens. Matter* **17**, L467–L475 (2005).
150. Wenzhong Wang, Bed Poudel, Jian Yang, D. Z. Wang, Z. F. Ren, "High-Yield Synthesis of Single Crystalline Antimony Telluride Hexagonal Nanoplates Using a Low-Temperature Organic Solution Approach", *J. of American Chemical Society* **127**, 13792-13793 (2005).
149. B. Poudel, W. Z. Wang, C. Dames, J. Y. Huang, S. Kunwar, D. Z. Wang, D. Banerjee, G. Chen, and Z. F. Ren, "Formation of Crystallized Titania Nanotubes and Their Transformation into Nanowires", *Nanotechnolgy* **16**, 1935 - 1940 (2005).
148. J. Y. Huang, K. Kempa, S. H. Jo, S. Chen, and Z. F. Ren, "Giant field enhancement at carbon nanotube tips induced by multistage effect", *Appl. Phys. Lett*. **87**, 053110 (2005).
147. W. Z. Wang, B. Poudel, D. Z. Wang, and Z. F. Ren, "Synthesis of PbTe Nanoboxes Using a Solvothermal Technique", *Advanced Materials* **17**, 2110 – 2114 (2005).
146. C. Dames, B. Poudel, W. Z. Wang, J. Y. Huang, Z. F. Ren, Y. Sun, J. I. Oh, C. Opeil, M. J. Naughton, and G. Chen, "Low-dimensional phonon specific heat of titanium dioxide nanotubes", *Appl. Phys. Lett*. **87**, 031901 (2005).
145. J. Y. Huang, S. Chen, S. H. Jo, Z. Wang, D.X. Han, G. Chen, M.S. Dresselhaus, and Z. F. Ren, "Atomic scale imaging of wall-by-wall breakdown and concurrent transport measurements in multiwall carbon nanotubes", *Phys. Rev. Lett*. **94**, 236802 (2005).
144. J. J. Hu, S. H. Jo, Z. F. Ren, A. A. Voevodin, and J. S. Zabinski, **"**Tribological behavior and graphitization of carbon nanotubes grown on 440C stainless steel", *Tribology Letters* **19**, 119 – 125 (2005).
143. J. Y. Huang, L.C. Zhang, S. Chen, D. Z. Wang, S. H. Jo, W. Z. Li, and Z. F. Ren, "Interface reactions in chromium buffer layer deposited between stainless steel and a silicon substrate", *Philosophical Magazine* **85**, 1459 – 1471 (2005).
142. D. Cai, J. Mataraza, Z. P. Huang, J. Y. Huang, Z. H. Qin, T. C. Chiles, D. Carnahan, K. Kempa, and Z. F. Ren, "Highly Efficient Molecular Delivery into Mammalian Cells Using Carbon Nanotube Spearing", *Nature Methods* **2**, 449 – 454 (2005).
141. Y. Wang, J. Rybczynski, D. Z. Wang, and Z. F. Ren, "Large-scale triangular lattice arrays of sub-micron islands by microsphere self-assembly", *Nanotechnology* **16**, 819 – 822 (2005).
140. W. Z. Wang, J. Y. Huang, D. Z. Wang, and Z. F. Ren, "Low-temperature Hydrothermal Synthesis of Multiwall Carbon Nanotubes", *Carbon* **43**, 1328 – 1331 (2005).
139. W. Z. Wang, B. Poudel, J. Y. Huang, D. Z. Wang, S. Kunwar, and Z. F. Ren, "Synthesis of Gram-scale Germanium Nanocrystals by a Low-temperature Inverse Micelle Solvothermal Route", *Nanotechnology* **16**, 1126 – 1129 (2005).

138. X. W. Wang, Z. F. Ren, and K. Kempa, "Improved superlensing in two-dimensional photonic crystals with a basis", *Appl. Phys. Lett*. **86**, 061105 (2005).
137. Y. Wang, X. Wang, J. Rybczynski, D. Z. Wang, K. Kempa, and Z. F. Ren, "Triangular lattice of carbon nanotube arrays for negative index of refraction and subwavelength lensing effect", *Appl. Phys. Lett*. **86**, 153120 (2005).
136. Y. Tu, Y. H. Lin, W. Yantasee**,** and Z. F. Ren**,** "Carbon Nanotubes Based Nanoelectrode Array: Fabrication, Evaluation, and Application in Voltammetric Analysis", *Eelctroanalysis* **17**, 79 - 84 (2005).
135. G. Y. Xiong, Y. Suda, D. Z. Wang, J. Y. Huang, Z. F. Ren, "Effect of temperature, pressure, and gas ratio of methane to hydrogen on synthesis of double-walled carbon nanotubes by chemical vapor deposition", *Nanotechnology* **16**, 532 – 535 (2005).
134. W. Z. Wang, J. Y. Huang, and Z. F. Ren, "Synthesis of Germanium Nanocubes by a Low Temperature Inverse Micelle Solvothermal Technique", *Langmuir* **21**, 751 – 754 (2005).
133. D. Banerjee, J. Rybczynski, J. Y. Huang, D. Z. Wang, K. Kempa, and Z. F. Ren, "Large hexagonal arrays of aligned ZnO nanorods", *Appl. Phys. A*. **80**, 749 – 752 (2005).
132. P. He, D. L. Shi, J. Lian, L. M. Wang, R. C. Ewing, W. V. Ooij, W. Z. Li, and Z. F. Ren, "Plasma deposition of thin carbonfluorine films on aligned carbon nanotube", *Appl. Phys. Lett*. **86**, 043107 (2005).
131. W. Z. Wang, S. Kunwar, J. Y. Huang, D. Z. Wang, and Z. F. Ren, "Low Temperature Solvothermal Synthesis of Multiwall Carbon Nanotubes", *Nanotechnology* **16**, 21 – 23 (2005).

2004

130. J. D. Dow, H. A. Blackstead, Z. F. Ren, and D. Z. Wang, "Magnetic Resonance of Cu and of Gd in Insulating $GdSr_2Cu_2NbO_8$ and in Superconducting $GdSr_2Cu_2RuO_8$", *JETP Letters* **80**, 190 – 194 (2004).
129. R. D. Bennett, G. Y. Xiong, Z. F. Ren, and R. E. Cohen, "Using Block Coplomer Micellar Thin Films as Templates for the Production of Catalysts for Carbon Nanotube Growth", *Chemistry of Materials* **26**, 5589 – 5595 (2004).
128. J. Chen, P. Spagnoal, R. N. Bhattacharya, and Z. F. Ren, "Preparation of high J(c) YBCO coated conductors on non-magnetic Ni-W substrates", *J. Phys. D: Appl. Phys.* **37**, 2623-2627 (2004).
127. J. Chen, P. P. A. Parilla, R. N. Bhattacharya, and Z. F. Ren, "Growth of biaxially textured CeO_2/YSZ/CeO_2 and $SrTiO_3$ buffer layers on textured Ni substrates by pulsed laser deposition", *Japanese Journal of Appl. Phys. Part 1 – Regular Papers Short Notes & Review Papers* **43**, 6040-6043 (2004).
126. D. Banerjee, S. H. Jo, and Z. F. Ren, "Enhanced field emission of ZnO nanowires", *Advanced Materials* **16**, 2028 – 2032 (2004).
125. Tarek A. El-Aguizy, Jeong-hyun Jeong, Yong-Bae Jeon, W. Z. Li, Z. F. Ren, and Sang-Gook Kim, "Transplanting carbon nanotubes", *Appl. Phys. Lett*. **85**, 5995 – 5997 (2004).
124. J. Rybczynski, D. Banerjee, A. Kosiorek, M. Giersig, Z. F. Ren, "Formation of super arrays of periodic nanoparticles and aligned ZnO nanorods - simulation and experiments", *NanoLetters* **4**, 2037 – 2040 (2004).

123. Y. Wang, J. Rybczynski, D. Z. Wang, K. Kempa, Z. F. Ren, W. Z. Li, and B. Kimball, "Periodicity and alignment of large-scale carbon nanotubes arrays", *Appl. Phys. Lett*. **85**, 4741 – 4743 (2004).
122. Y. Wang, K. Kempa, B. Kimball, J. B. Carlson, G. Benham, W. Z. Li, T. Kempa, J. Rybczynski, A. Herczynski, and Z. F. Ren, "Receiving and Transmitting Light-like Radio Waves: Antenna Effect in Arrays of Aligned Carbon Nanotubes", *Appl. Phys. Lett*. **85**, 2607 – 2609 (2004).
121. J. Chen, R. N. Bhattacharya, Z. F. Ren, "Processing of electroplated Bi-2212/Ag tapes using a melt-quench and annealing method", *J. of Physics D - Applied Physics* **37**, 1 – 5 (2004).
120. S. H. Jo, D. Banerjee, and Z. F. Ren, "Field emission of zinc oxide nanowires grown on carbon cloth", *Appl. Phys. Lett*. **85**, 1407 – 1409 (2004).
119. X. W. Wang, Z. F. Ren and K. Kempa, "Unrestricted superlensing in a triangular two-dimensional photonic crystal", *Optics Express* **12**, 2919 – 2924 (2004).
118. S. H. Jo, D. Z. Wang, J. Y. Huang, W. Z. Li, K. Kempa, and Z. F. Ren, "Field Emission of Carbon Nanotubes Grown on Carbon Cloth", *Appl. Phys. Lett*. **85**, 810 – 812 (2004).
117. S. Chen, D. Z. Wang, J. Y. Huang, and Z. F. Ren, "Synthesis and Characterization of Boron Carbide Nanoparticles", *Appl. Phys. A* **79**, 1757 – 1759 (2004).
116. J. A. Rojas-Chapana, M. A. Correa-Duarte, Z. F. Ren, K. Kempa, and M. Giersig, "Enhanced Introduction of Gold Nanoparticles into Vital Acidothiobacillus Ferrooxidans by Carbon Nanotubes-based Microwave Electroporation", *NanoLetters* **4**, 985 – 988 (2004).
115. X. W. Wang, K. Kempa, Z. F. Ren, and B. Kimball, "Rapid Photon Flux Switching in Two-Dimensional Photonic Crystals", *Appl. Phys. Lett*. **84**, 1817 – 1819 (2004).
114. Y. H. Lin, F. Lu, Y. Tu, and Z. F. Ren, "Glucose Biosensors Based on Carbon Nanotube Nanoelectrode Ensembles", *NanoLetters* **4**, 191 – 195 (2004).
113. J. Y. Lao, J. Y. Huang, D. Z. Wang, Z. F. Ren, "Hierarchical Oxide Nanostructures", *J. of Materials Chemistry* **14**, 770 – 773 (2004).
112. J. Y. Lao, J. Y. Huang, D. Z. Wang, Z. F. Ren, D. Steeves, B. Kimball, and W. Porter, "ZnO Nanowalls", *Appl. Phys. A* **78**, 539 – 542 (2004).
111. J. Y. Lao, J. Y. Huang, D. Z. Wang, Z. F. Ren, "Self-assembled In_2O_3 Nanocrystal Chains and Nanowire Networks", *Advanced Materials* **16**, 65 – 69 (2004).
110. H. Tang, J. H. Chen, Z. P. Huang, D. Z. Wang, Z. F. Ren, L. H. Nie, Y. F. Kuang, S. Z. Yao, "High dispersion and electrocatalytic properties of platinum on well-aligned carbon nanotube arrays", *Carbon* **42**, 191 – 197 (2004).
109. S. H. Jo, Y. Tu, Z. P. Huang, D. L. Carnahan, J. Y. Huang, D. Z. Wang, Z. F. Ren, "Correlation of field emission and surface microstructure of vertically aligned carbon nanotubes", *Appl. Phys. Lett*. **84**, 413 – 415 (2004).
108. D. Banerjee, J. Y. Lao, D. Z. Wang, J. Y. Huang, D. Steeves, B. Kimball, and Z. F. Ren, "Synthesis and photoluminescence studies on ZnO nanowires", *Nanotechnology* **15**, 404 – 409 (2004).
107. R. N. Bhattacharya, J. Chen, P. Spagnol, J. Y. Huang, and Z. F. Ren, "Superconductor Bi-oxide films via an electrodeposition process", *Supercond. Sci. Technol*. **17**, 120 – 124 (2004).

2003

106. D. R. Harshman, J. D. Dow, W. J. Kossler, D. R. Noakes, C. E. Stronach, A. J. Greer, E. Koster, Z. F. Ren, D. Z. Wang, "Muon spin rotation in $GdSr_2Cu_2RuO_8$: implications", *Philosophical Magzine* **83**, 3055 - 3064 (2003).
105. S. H. Jo, J. Y. Lao, Z. F. Ren**,** R. A. Farrer, T. Baldacchini, and J. T. Fourkas**, "**Field emission studies on thin films of zinc oxide nanowires", *Appl. Phys. Lett*. **83**, 4821 – 4823 (2003).
104. D. Banerjee, J. Y. Lao, D. Z. Wang, J. Y. Huang, and Z. F. Ren, D. Steeves, B. Kimball, and M. Sennett, "Large quantity free-standing ZnO nanowires", *Appl. Phys. Lett*. **83**, 2061 – 2063 (2003).
103. J. G. Wen, J. Y. Lao, D. Z. Wang, T. M. Kyaw, Y. L. Foo, Z. F. Ren, "Self-assembly of semiconducting oxide nanowires, nanorods, and nanoribbons", *Chem. Phys. Lett*. **372**, 717-722 (2003).
102. S. H. Jo, Y. Tu, Z. P. Huang, D. L. Carnahan, D. Z. Wang, Z. F. Ren, "Effect of length and spacing of vertically aligned carbon nanotubes on field emission properties", *Appl. Phys. Lett.* **82**, 3520 – 3522 (2003).
101. J. Moser, R. Panepucci, Z. P. Huang, W. Z. Li, Z. F. Ren, A. Usheva, M. J. Naughton, "Individual free-standing carbon nanofibers addressable on the 50 nm scale", *J. Vac. Sci. Technol.* B **21**, 1004 – 1007 (2003).
100. Y. Tu, Yuehe Lin, Z. F. Ren, "Nanoelectrode Arrays Based on Low Site Density Aligned Carbon Nanotubes", *NanoLetters* **3**, 107 - 109 (2003).
99. J. Y. Lao, J. Y. Huang, D. Z. Wang, Z. F. Ren, "ZnO nanobridges and nanonails", *NanoLetters* **3**, 235 – 238 (2003).
98. W. Z. Li, J. G. Wen, Z. F. Ren, "Clean Double-walled Carbon Nanotubes Synthesized by CVD", *Chem. Phys. Lett.* **368**, 299–306 (2003).
97. K. Kempa, B. Kimball, J. Rybczynski, Z. P. Huang, P. F. Wu, D. Steeves, M. Sennett, M. Giersig, D. V. G. L. N. Rao, D. L. Carnahan, D. Z. Wang, J. Y. Lao, W. Z. Li, and Z. F. Ren, "Photonic crystals based on periodic arrays of aligned carbon nanotubes", *NanoLetters* **3**, 13 - 18 (2003).
96. Z. P. Huang, D. L. Carnahan, J. Rybczynski, M. Giersig, M. Sennett, D. Z. Wang, J. G. Wen, K. Kempa, Z. F. Ren, "Growth of Large Periodic Arrays of Carbon Nanotubes", *Appl. Phys. Lett*. **82**, 460 - 462 (2003).
95. D. Z. Wang, H. I. Ha, J. I. Oh, J. Moser, J. G. Wen, M. J. Naughton, Z. F. Ren, "Synthesis and Properties of Superconductor $RuSr_2GdCu_2O_8$", *Physica C* **384**, 137-142 (2003).
94. M. Sennett, E. Welsh, J. B. Wright, W. Z. Li, J. G. Wen, and Z. F. Ren, "Dispersion and Alignment of Carbon Nanotubes in Polycarbonate", *Appl. Phys. A* **76**, 111-113 (2003).

2002

93. R. N. Bhattacharya, D. Banerjee, J. G. Wen, R. Padmanabhan, Y. T. Wang, J. Chen, Z. F. Ren, A. M. Hermann, R. D. Blaugher, "Structural Studies of Electrodeposited and Sprayed Thallium-oxide Films", *Superconductor Science and Technology* **15**, 1288 - 1294 (2002).
92. J. Y. Lao, J. G. Wen, and Z. F. Ren, "Hierarchical ZnO nanostructures", *NanoLetters* **2**, 1287 – 1291 (2002).
91. J. Y. Lao, J. G. Wen, D. Z. Wang, Z. F. Ren, "Synthesis of Amorphous SiO_x Nanostructures", *International Journal of Nanoscience* **1**, 149 - 157 (2002).

90. Y. Tu, Z. P. Huang, D. Z. Wang, J. G. Wen, Z. F. Ren, "Growth of Aligned Carbon Nanotubes with Controlled Site Density", *Appl. Phys. Lett*. **80**, 4018 - 4020 (2002).
89. E. T. Thostenson, W. Z. Li, D. Z. Wang, Z. F. Ren, and T. W. Chou, "carbon nanotube / carbon fiber hybrid multi-scale composites", *J. of Appl. Phys*. **91**, 6034 - 6037 (2002).
88. Z. P. Huang, D. Z. Wang, J. G. Wen, M. Sennett, H. Gibson, and Z. F. Ren, "Effect of nickel, iron, and cobalt on growth of aligned carbon nanotubes", *Appl. Phys. A* **74**, 387-391 (2002).
87. W. Z. Li, J. G. Wen, and Z. F. Ren, "Effect of temperature on growth and structure of carbon nanotubes by chemical vapor deposition", *Appl. Phys. A* **74**, 397 - 402 (2002).
86. J. Y. Lao, W. Z. Li, J. G. Wen, and Z. F. Ren "Boron Carbide Nanolumps on Carbon Nanotubes", *Appl. Phys. Lett*. **80**, 500 - 502 (2002).
85. R. N. Bhattacharya, Z. Xing, J. Z. Wu, J. Chen, S. X. Yang, Z. F. Ren, and R. D. Blaugher, "Superconducting Thallium Oxide and Mercury Oxide Films", *Physica C* **377**, 327 – 332 (2002).
84. J. G. Wen, D. Z. Wang, S. X. Yang, and Z. F. Ren, "Microstructures of $Tl_2Ba_2CuO_6$ thin films with different doping levels", *Physica C* **366**, 203 - 210 (2002).
83. J. H. Chen, Z. P. Huang, D. Z. Wang, S. X. Yang, W. Z. Li, J. G. Wen, and Z. F. Ren "Electrochemical Synthesis of Polypyrrole Films over Each of Well-Aligned Carbon Nanotubes", *Synthetic Metals* **125**, 289-294 (2002).
82. J. H. Chen, W. Z. Li, D. Z. Wang, S. X. Yang, J. G. Wen, Z. F. Ren, "Electrochemical characterization of carbon nanotubes as electrode in electrochemical double-layer capacitors," *Carbon* **40**, 1193-1197 (2002).

2001

81. H. A. Blackstead, J. D. Dow, D. R. Harshman, D. B. Pulling, Z. F. Ren, D. Z. Wang, "Magnetic resonance and Mossbauer studies of $GdSr_2Cu_2RuO_8$ Physica C **364**, 305-308 (2001).
80. W. Z. Li, J. G. Wen, Z. F. Ren, "Straight carbon nanotube Y-junctions", *Appl. Phys. Lett*. **79**, 1879 - 1881 (2001).
79. W. Z. Li, J. G. Wen, Y. Tu, and Z. F. Ren, "Effect of Gas Pressure on the Growth and Structure of Carbon Nanotubes by Chemical Vapor Deposition", *Appl. Phys. A* **73**, 259-264 (2001).
78. J. H. Chen, Z. P. Huang, D. Z. Wang, S. X. Yang, J. G. Wen, and Z. F. Ren, "Electrochemical synthesis of polypyrrole / carbon nanotube nanoscale composites using well-aligned carbon nanotube arrays", *Appl. Phys. A*. **73**, 129-131 (2001).
77. E. T. Thostenson, Z. F. Ren and Tsu-Wei Chou, "Advances in the science and technology of carbon nanotubes and their composites: a review", *Composites Science and Technology* **61**, 1899-1912 (2001).
76. J. G. Wen, Z. P. Huang, D. Z. Wang, J. H. Chen, S. X. Yang, Z. F. Ren J. H. Wang, L. E. Calvet, J. Chen, J. F. Klemic, M. A. Reed, "Growth and characterization of aligned carbon nanotubes from patterned nickel nanodots and uniform thin films", *Journal of Materials Research* **16**, 3246-3253 (2001).
75. W. Z. Li, D. Z. Wang, S. X. Yang, J. G. Wen, and Z. F. Ren, "Controlled Growth of Carbon Nanotubes on Graphite Foil by Chemical Vapor Deposition", *Chemical Physics Letters* **335**, 141-149 (2001).

74. D. Z. Wang, H. I. Ha, S. X. Yang, J. I. Oh, J. G. Wen, M. J. Naughton, Z. F. Ren, "Synthesis and characterization of heavily overdoped $Tl_2Ba_2CuO_{6+\delta}$ thin films", *Physica C* **355**, 251 – 256 (2001).

2000

73. D. C. Smith, P. Gay, C. J. Stevens, C. Chen, G. Yang, S. J. Abell, D. Z. Wang, J. H. Wang, Z. F. Ren, and J.F. Ryan, "Femtosecond dynamics of BSCCO-2212 in the weak and strong excitation limits", *Physica C* **341-348**, 2221-2222 (2000).
72. D. C. Smith, P. Gay, D. Z. Wang, J. H. Wang, Z. F. Ren, J. F. Ryan, "Ultrafast quasiparticle dynamics in $Tl_2Ba_2CuO_{6+\delta}$", *Physica C* **341-348**, 2219-2220 (2000).
71. H. Yan, J. Jung, H. Darhmaoui, Z. F. Ren, J. H. Wang, and W. K. Kwok, "Fast vortex motion and filamentary phase separation in high-Tc thin films", *Phys. Rev. B* **61**, 11711-11721 (2000).
70. J. Y. Lao, J. H. Wang, D. Z. Wang, Y. Tu, S. X. Yang, H. L. Wu, Z. F. Ren, D. T. Verebelyi, M. Paranthaman, T. Aytug, D. K. Christen, R. N. Bhattacharya, and R. D. Blaugher, "Synthesis and Characterization of Chromium-Containing Thallium-Based 1212 Films", *Physica C* **333**, 221 - 228 (2000).
69. R. N. Bhattacharya, H.L. Wu, Y. T. Wang, R. D. Blaugher, S. X. Yang, D. Z. Wang, Z. F. Ren, Y. Tu, D. T. Verebelyi, and D. K. Christen, " Improved Electrodeposition Process for the Preparation of Superconducting Thallium Oxide Films", *Physica C* **333**, 59 - 64 (2000).
68. J. Y. Lao, J. H. Wang, D. Z. Wang, S. X. Yang, Y. Tu, J. G. Wen, H. L. Wu, Z. F. Ren, D. T. Verebelyi, M. Paranthaman, T. Aytug, D. K. Christen, R. N. Bhattacharya, and R. D. Blaugher, "Synthesis and Characterization of Thallium-Based 1212 Films with High Critical Current Density on $LaAlO_3$ Substrates", *Superconductor Science and Technology* **13**, 173-177 (2000).
67. A. K. Pradhan, B. K. Roul, J. G. Wen, Z. F. Ren, M. Muralidhar, P. Dutta, D. R. Sahu, S. Mohanty, and P. K. Patro, "Enhanced room-temperature magnetoresistance in partially melted $La_{0.67}Ca_{0.33}MaO_3$ manganites", *Appl. Phys. Lett.* **76**, 763 – 765 (2000).

1999

66. R. N. Bhattacharya, P. A. Parilla, R. D. Blaugher, Z. F. Ren, W. Li, J. H. Wang, Y. T. Wang, A. M. Hermann, M. Paranthaman, A. Goyal, D. T. Verebelyi, D. K. Christen, "Superconducting $(TlBi)_{0.9}Sr_{1.6}Ba_{0.4}Ca_2Cu_3Ag_{0.2}O_x$ films from electrodeposited precursors", *IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY* **9**, 1681-1683 (1999).
65. B. W. Kang, J. Z. Wu, W. N. Kang, Q. Y. Chen, W. K. Chu, Z. F. Ren, J. H. Wang, "Effect of Anion Doping on Hall Sign Anomaly in the Mixed-State of $Tl_2Ba_2CuO_{6+\delta}$ Thin Films", *Philosophical Magazine Letters* **79**, 41-48 (1999).
64. D. C. Smith, P. Gay, C. J. Stevens, D. Z. Wang, J. H. Wang, Z. F. Ren, and J. F. Ryan, "Ultrafast Optical Response of $Tl_2Ba_2CuO_{6+\delta}$", *Journal of Low Temperature Physics* **117**, 1059 –1063 (1999).
63. A. A. Tsvetkov, D. Dulic, D. van der Marel, A. Damascelli, G. A. Kaljushnaia, J. I. Gorina, N. N. Senturina, N. N. Kolesnikov, Z. F. Ren, J. H. Wang, A. A. Menovsky, and T. T. M.

Palstra, “Systematics of c-axis phonons in the thallium- and bismuth-based cuprate superconductors”, *Phys. Rev. B* **60**, 13196-13205 (1999).

62. H. Paranthaman, D. F. Lee, R. Feenstra, A. Goyal, D. T. Verebelyi, D. K. Christen, E. D. Specht, F. A. List, P. M. Martin, D. M. Kroeger, Z. F. Ren, W. Li, D. Z. Wang, J. Y. Lao, J. H. Wang, "Optimization of buffer lagers on rolled-Ni substrates for high current YBCO and Tl,Bi-1223 coated conductors using ex-situ precursor approaches", *IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY* **9**, 2268-2271 (1999).
61. D. Dulic, D. van der Marel, A. A. Tsvetkov, W. N. Hardy, Z. F. Ren, J. H. Wang, and B. A. Willemsen, “c-axis penetration depth and interlayer conductivity in the thallium-based cuprate superconductors”. *Phys. Rev. B* **60**, R15051-R15054 (1999).
60. P. Gay, D. C. Smith, C. J. Stevens, C. Chen, G. Yang, S. J. Abell, D. Z. Wang, J. H. Wang, Z. F. Ren, and J. F. Ryan, “Femtosecond Dynamics of BSCCO-2212,” *Journal of Low Temperature Physics* **117**, 1025 –1029 (1999).
59. R. P. Vasquez, M. P. Siegal, D. L. Overmyer, Z. F. Ren, J. Y. Lao, and J. H. Wang, “Tl Cuprate Superconductors Studied by XPS”, *Surface Science Spectra* **6**, 237-253 (1999).
58. M. DeMarco, D. Graf, J. Rijssenbeek, R. J. Cava, D. Z. Wang, Y. Tu, Z. F. Ren, J. H. Wang, M. Haka, S. Toorongian, M. Leone, and M. J. Naughton, "Transitions in $Sr_2Ru_xIr_{1-x}O_4$ studied by the ^{99}Ru Mossbauer Effect", *Phy. Rev. B* **60**, 7570 –7574 (1999).
57. W. Li, D. Z. Wang, J. Y. Lao, Z. F. Ren, J. H. Wang, M. Paranthaman, D. T. Verebelyi, and D. K. Christen, "Epitaxial Superconducting $Tl_{0.5}Pb_{0.5}Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_9$ Films on $LaAlO_3$ by Thermal Spray and Post-Spray Annealing”, *Superconductor Science and Technology* **12** (5), L1 – L4 (1999).
56. Z. F. Ren, Z. P. Huang, J. W. Xu, D. Z. Wang, J. G. Wen, J. H. Wang, L. Calvet, J. Chen, J. F. Klemic, and M. A. Reed, “Growth of a Single Freestanding Multiwall Carbon Nanotube on Each Nanonickel Dot”, *Appl. Phys. Lett.* **75**, 1086 – 1088 (1999).
55. R. P. Vasquez, M. P. Siegal, Z. F. Ren, J. Y. Lao, and J. H. Wang, “Chemical Bonding in Tl Cuprates Studied by X-ray Photoemission”, *Phys. Rev. B* **60**, 4309 - 4319(1999).
54. Z. F. Ren, W. Li, D. Z. Wang, J. Y. Lao, J. H. Wang, M. Paranthaman, D. T. Verebelyi, and D. K. Christen, "In-Plane Aligned Superconducting $Tl_{0.78}Bi_{0.22}Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_9$ Films on Rolling Assisted Biaxially Textured Substrates (RABiTS)", *Physica C* **313**, 241-245 (1999).

1998

53. R. P. Vasquez, Z. F. Ren, and J. H. Wang, "$Tl_2Ba_2CuO_{6+\delta}$ by XPS", *Surface Science Spectra* **5**, 304 - 312 (1998).
52. Z. F. Ren, Z. P. Huang, J. W. Xu, J. H. Wang, P. Bush, M. P. Siegal, and P. N. Provencio, "Synthesis of Large Arrays of Well-Aligned Carbon Nanotubes on Glass", *Science* **282**, 1105 – 1107 (1998).
51. Z. P. Huang, J.W. Xu, Z. F. Ren, J. H. Wang, M. P. Siegal, and P. N. Provencio, "Growth of Large-Scale Well-Aligned Carbon Nanotubes by Plasma Enhanced Hot Filament Chemical Vapor Deposition", *Appl. Phys. Lett* **73**, 3845 3847 (1998).
50. R. Surdeanu, R. J. Wijngaarden, B. Dam, J. Rector, R. Griessen, C. Rossel, Z. F. Ren, and J. H. Wang, "Crossover between fractal and nonfractal flux penetration in high-temperature superconducting thin films", *Phys. Rev. B* **58**, 12467 –12477 (1998).

49. Z. F. Ren, W. Li, D. Z. Wang, J.Y. Lao, J. H. Wang, M. Paranthaman, D. T. Verebelyi, and D. K. Christen, "Growth and Characterization of Superconducting Films $Tl_{0.78}Bi_{0.22}Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_9$ on CeO_2-Buffered Single Crystal YSZ", *Physica C* **306**, 149 – 153 (1998).
48. R. N. Bhattacharya, R. D. Blaugher, Z. F. Ren, W. Li, J. H. Wang, M. Paranthaman, D. T. Verebelyi, and D. K. Christen, "Superconducting Epitaxial $(TlBi)_{0.9}Sr_{1.6}Ba_{0.4}Ca_2Cu_3Ag_{0.2}O_x$ Film from an Electrodeposited Precursor", *Electrochemical and Solid-State Letters* **1**, 165 – 167 (1998).
47. A. A. Tsvetkov, D. van der Marel, K. A. Moler, and J. R. Kirtley, J. L. de Boer, A. Meetsma, Z. F. Ren, N. Koleshnikov, D. Dulic, A. Damascelli, M. Gruninger, J. Schutzmann, J. W. van der Eb, and J. H. Wang, "Global and Local Measures of the Intrinsic Josephson Coupling in $Tl_2Ba_2CuO_{6+\delta}$ as a Test of the Interlayer Tunneling Model", *Nature* **395**, 360 – 362 (1998).
46. R. N. Bhattacharya, R. D. Blaugher, Z. F. Ren, W. Li, J. H. Wang, M. Paranthaman, D. T. Verebelyi, and D. K. Christen, "Superconducting Thallium Oxide Films by the Electrodeposition Method", *Physica C* **304**, 55 – 65 (1998).
45. M. Willemin, C. Rossel, J. Hofer, H. Keller, Z. F. Ren, and J. H. Wang, "Pairing symmetry from in-plane torque anisotropy in $Tl_2Ba_2CuO_{6+\delta}$ thin films", *Phys. Rev. B* **57**, 6137 – 6144 (1998).
44. Z. F. Ren, J. Y. Lao, L. P. Guo, J. H. Wang, J. D. Budai, D. K. Christen, A. Goyal, M. Paranthaman, E. D. Specht, and J. R. Thompson, "Epitaxial film growth of $Tl_{0.78}Bi_{0.22}Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ on rolling asissted biaxially textured nickel substrates with YSZ and CeO_2 buffer layers", *J. of Superconductivity* **11**, 159 – 162 (1998).

1997

43. R. Surdeanu, R. J. Wijngaarden, R. Griessen, C. Rossel, Z. F. Ren, and J. H. Wang, "Crossover from fractal to non-fractal flux penetration in vicinal $Tl_2Ba_2CuO_{6+\delta}$ thin films", *Physica C* **282-287**, 2219 – 2220 (1997).
42. C. Rossel, M. Willemin, J. Hofer, H. Keller, Z. F. Ren, and J. H. Wang, "Pairing symmetry in single-layer tetragonal $Tl_2Ba_2CuO_{6+\delta}$ from in-plane torque anisotropy", *Physica C* **282-287**, 136 – 139 (1997).
41. A. Hoffman, I. K Schuller, Z. F. Ren, J. Y. Lao, and J. H. Wang, "Persistent photoconducivity in overdoped high T_c thin films", *Phys. Rev. B* **56**, 13742 – 13745 (1997).
40. Z. F. Ren, J. H. Wang, and D. J. Miller, "Continuous control of the superconducting transition temperature from overdoped to underdoped regimes in tetragonal $Tl_2Ba_2CuO_{6+\delta}$ Thin Films", *Appl. Phys. Lett*. **71**, 1706 – 1708 (1997).
39. J. R. Thompson, L. Krusin-Elbaum, D. K. Christen, K. J. Song, M. Paranthaman, J. L. Ullman, J. Z. Wu, Z. F. Ren, J. H. Wang, J. E. Tkaczk, and J. A. DeLuca, "Current-density enhancements of the highest-T_c superconductors with GeV protons", *Appl. Phys. Lett*. **71**, 536 – 538 (1997).
38. J. Schutzmann, H. S. Somal, A. A. Tsvetkov, D. van der Marel, G. Koops, N. Koleshnokov, Z. F. Ren, J. H. Wang, E. Bruck, and A.A. Menovski, "Experimental test of the interlayer pairing models for high-T_c superconductivity using grazing-incidence infrared reflectometry", *Phys. Rev. B* **55**, 11118 – 11121 (1997).

37. C. C. Tsuei, J. R. Kirtley, Z. F. Ren, J. H. Wang, H. Raffy, and Z. Z. Li, "Pure d_{x2-y2} order-parameter symmetry in the tetragonal superconductor $Tl_2Ba_2CuO_{6+\delta}$", *Nature* **387**, 481-483 (1997).
36. L. P. Guo, Z. F. Ren, J. Y. Lao, J. H. Wang, D. K. Christen, C. E. Klabunde, and J. D. Budai, "Epitaxial Superconducting Thin Films $Tl_{0.78}Bi_{0.22}Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ on (001) YSZ Synthesized by Laser Ablation and Post-Annealing in Pure Argon", *Physica C* **277**, 13 – 18 (1997).

1996

35. C. C. Tsuei, J. R. Kirtley, A. Gupta, J. Z. Sun, K. A. Moler, Z. F. Ren, and J. H. Wang, "Half-Integer Flux Quantum Effect in Cuprates Superconductors – A Probe of Pairing Symmetry", *Physica Scripta* **T66**, 212 – 214 (1996).
34. J. R. Kirtley, C. C. Tsuei, K. A. Moler, J. Z. Sun, A. Gupta, Z. F. Ren, J. H. Wang, Z. Z. Li, H. Raffy, J. Manhart, H. Hilgenkamp, B. Mayer, and C. Gerber, "Scanning SQUID Microscope Tests of the Symmetry of the High-Tc Gap", *Czechoslovak Journal of Physics* **46**, 3169 – 3176 (1996).
33. Z. F. Ren, J. H. Wang, and D. J. Miller, "The Structural Symmetry of Epitaxial $Tl_2Ba_2CuO_{6+\delta}$ Thin Films", *Appl. Phys. Lett*. **69**, 1798 – 1800 (1996).
32. R. P. Vasquez, Z. F. Ren, and J. H. Wang, "Electronic structure of $Tl_2Ba_2CuO_{6+\delta}$ epitaxial films measured by X-ray photoemission", *Phy. Rev. B* **54**, 6115 – 6118 (1996).
31. J. R. Kirtley, C. C. Tsuei, J. Z. Sun, A. Gupta, K. A. Moler, C. A. Wang, Z. F. Ren, and J. H. Wang, "Tricrystal determination of the symmetry of cuprate superconductors", *Turkish J. of Physics* **20**, 576 – 593 (1996).
30. C. A. Wang, Z. F. Ren, J. H. Wang, D. K. Petrov, M. J. Naughton, W. Y. Yu, and A. Petrou, "Superconducting Epitaxial $Tl_2Ba_2CuO_{6+\delta}$ Thin Films on $SrTiO_3$ with Tetragonal Lattice and Continuously Adjustable Critical Temperature", *Physica C* **262**, 98 – 102 (1996).
29. M. Chaparala, O. H. Chung, Z. F. Ren, M. White, P. Coppens, J. H. Wang, A. P. Hope and M. J. Naughton, "Vortex-state resistance near parallel orientation in layered superconductors", *Phys. Rev. B* **53**, 5818 – 5825 (1996).
28. Z. F. Ren, C. A. Wang, J. H. Wang, D. J. Miller, D. K. Christen, J. D. Hettinger, and K. E. Gray, "Composition and Phase Development of Epitaxial Superconducting $Tl_{0.78}Bi_{0.22}Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ Thin Films by Laser Ablation and Post Annealing", *Physica C* **258**, 129 – 136 (1996).
27. C. C. Tsuei, J. R. Kirtley, M. Rupp. J. Z. Sun, A. Gupta, M. B. Ketchen, C. A. Wang, Z. F. Ren, J. H. Wang, and M. Bhushan, "Half-Integer Flux Quantum Effect and Pairing Symmetry in High-T_c One-Layer Tetragonal $Tl_2Ba_2CuO_{6+\delta}$ Superconductors", *Science* **271**, 329 – 332 (1996).

1995

26. I. S. Ghosh, L. F. Cohen, J. V. Thomas, J. L. MacManusDriscoll, R. Somekh, M. Lenkens, S. Hensen, G. Muller, D. Jedamzik, Z. F. Ren, C. A. Wang, J. H. Wang, J. C. Gallop, A. D. Caplin, "Correlations between rf- and dc-magnetic field induced microwave losses and the

de-screening current density" *J in HTS thin films, APPLIED SUPERCONDUCTIVITY* **1 & 2**, 1083-1086 (1995).

25. C. A. Wang, Z. F. Ren, and J. H. Wang, "Synthesis of Epitaxial (TlBi)$Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ Thin Films at Low Temperature in Pure Argon", *Appl. Supercond*. **3**, 153 – 156 (1995).
24. Z. F. Ren, C. A. Wang, J. H. Wang, D. J. Miller, and K. C. Goretta, "Improvement of Transport Critical Current Density in In-Situ Synthesized Silver-Sheathed Superconducting Tapes of $Tl_{0.78}Bi_{0.22}Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ by Intermediate Annealing and Pressing", *Physica C* **247**, 163 – 168 (1995).
23. W. Y. Yu, A. Petrou, C. A. Wang, Z. F. Ren, and J. H. Wang, "Raman Study of Phonons in Superconducting Epitaxial (TlBi)$Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ Films", *Appl. Supercond*. **3**, 147 – 157 (1995).
22. C. A. Wang, Z. F. Ren, J. H. Wang, and D. J. Miller, "Superconductivity and Microstructure of Epitaxial (TlBi)$Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ Films", *Physica C* **245**, 171 – 180 (1995).
21. Z. F. Ren, C. A. Wang, J. H. Wang, and D. J. Miller, "Superconductivity and Microstructural Characterization of Epitaxial (TlBi)$Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ Thin Films", *Appl. Supercond*. **3**, 133 – 138 (1995).
20. Y. F. Li, Z. Z. Sheng, Z. F. Ren, J. H. Wang, and K. C. Goretta, "Fabrication of Ag-Clad $(Tl,V)(Sr,Ba)_2Ca_2Cu_3O_y$ Superconducting Tapes", *Supercond. Sci. Technol*. **8**, 174 – 176 (1995).

1994

19. D. K. Petrov, Z. F. Ren, C. A. Wang, J. H. Wang, and M. J. Naughton, "Break Junction Tunneling in High Temperature Superconductors", *Appl. Supercond*. **2**, 729 – 734 (1994).
18. D. J. Miller, J. G. Hu, Z. F. Ren, and J. H. Wang, "Microstructural Development and Critical Currents in Long-Length (Tl,Bi)-(Sr,Ba)-Ca-Cu-O Wires", *J. Electronic Mater*. **23**, 1151 – 1158 (1994).
17. R. N. Bhattacharya, A. Duda, D. S. Ginley, J. A. DeLuca, Z. F. Ren, C. A. Wang, and J. H. Wang, "Superconducting Thallium Oxide Films via an Electro-Deposited Precursor", *Physica C* **229**, 145 – 151 (1994).
16. Z. F. Ren, C. A. Wang, and J. H. Wang, "Superconducting Epitaxial (TlBi)$Sr_{1.6}Ba_{0.4}Ca_2Cu_3O_{9-\delta}$ Film with High Critical Current in Magnetic Field", *Appl. Phys. Lett*. **65**, 237 – 239 (1994).
15. Z. F. Ren, J. H. Wang, D. J. Miller, and K. C. Goretta, "Relationship between Grain Connectivity, Alignment, and Critical Current Density in High-Temperature Superconducting Bulk Materials", *Physica C* **229**, 137 – 144 (1994).

1993

14. Z. F. Ren and J. H. Wang, "Enhanced Formation of 1223 Phase by Partial Replacement of Bi for Tl in *In Situ* Synthesized Silver-Sheathed Superconducting Tape of $Tl_{1-x}Bi_xSr_{2-y}Ba_yCa_2Cu_3O_{9-\delta}$", *Physica C* **216**, 199 – 204 (1993).
13. Z. F. Ren and J. H. Wang, "Superior Flux-Pinning in *In Situ* Synthesized Silver-Sheathed Superconducting Tape of $Tl_{0.5}Pb_{0.5}Ba_{0.4}Sr_{1.6}Ca_{0.8}Y_{0.2}Cu_3O_y$", *Appl. Phys. Lett*. **62**, 3025 – 3027 (1993).

1992

12. Z. F. Ren and J. H. Wang, "Uniform and Flexible 24-Meter Superconducting Tape of Silver-Sheathed $Tl_{0.5}Pb_{0.5}Ba_{0.4}Sr_{1.6}Ca_2Cu_3O_{8.2}$", *Appl. Phys. Lett*. **61**, 1715 – 1717 (1992).
11. M. Qi, Z. F. Ren, Y. Gao, P. Lee, Y. L. Soo, and J. H. Wang, "The Influence of Hydrogen Reduction on Single Crystals of $Bi_2Sr_2CaCu_2O_y$", *Physica C* **192**, 55 – 59 (1992).

1991

10. Z. F. Ren, M. Qi, and J. H. Wang, "Enhancement of Critical Current Density in Tl-Ba-Ca-Cu-O Type Superconductors by the Addition of SnO_2", *Physica C* **184**, 24 – 28 (1991).
9. Z. F. Ren and J. H. Wang, "Effect of Compressive Reorientation on the T_c and J_c of the Superconducting Composite $Ag_xBi_{1.7}Pb_{0.3}Sr_2Ca_2Cu_3O_{10}$", *J. Mater. Sci. Lett*. **10**, 1139 – 1141 (1991).
8. Z. F. Ren, M. J. Naughton, P. Lee, and J. H. Wang, "Growth of Superconducting Single Crystals of $Tl_mBa_2Ca_{n-1}Cu_nO_y$ in a Convenient Way", *J. Crystal Growth* **112**, 587 – 590 (1991).

1990

7. Z. F. Ren, Y. F. Chen, Y. D. Jiang, and W. Y. Guan, "Single Crystal Growth and Characterization in Ca-Doped Y-Ba-Cu-O System", *J. Mater. Sci. Lett*. **9**, 738 – 740 (1990).
6. Z. F. Ren, J. G. Wen, Y. D. Jiang, and W. Y. Guan, "Growth and Characterization of 2201 Single Crystals in Bi-based System", *J. Crystal Growth* **102**, 349 – 353 (1990).

1989

5. Z. F. Ren, Xiuli Yan, Y. D. Jiang, and W. Y. Guan, "Effects of Growth Conditions on the Size of Superconducting Crystals in Bi-Sr-Ca-Cu-O System", *Chinese Phys. Lett*. **6**, 333 – 334 (1989).
4. J. G. Wen, Y. Liu, Z. F. Ren, Y. F. Yan, Y. Q. Zhou, and K. K. Fung, "A Structure Study of Undoped and Doped $Bi_2Sr_2CuO_6$ Phase by Transmission Electron Microscopy", *Appl. Phys. Lett*. **55**, 2775 – 2777 (1989).
3. Z. F. Ren, Xiuli Yan, Y. D. Jiang, and W. Y. Guan, "The Best Composition for Growing Large Single Crystals in Bi-Sr-Ca-Cu-O System", *Rengong Jingti* **18**, 97 – 101 (1989).

1988

2. Z. F. Ren, Xiuli Yan, Y. D. Jiang, and W. Y. Guan, "Growth of Superconducting Single Crystals of Composition Bi:Sr:Ca:Cu=2:2:1:2 in the Bi-Sr-Ca-Cu-O System", *J. Crystal Growth*, **92**, 677 – 681 (1988).
1. Z. F. Ren and C. F. Zhang, "Transformation of Crystal Morphology of Eutectic Composite *In Situ*", *Jinshu Xuebao* **24**, B299 – B301 (1988).