WONBONG CHOI

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Dr. Choi's Nanomaterials and Device Laboratory is conducting basic and applied research at the frontier of nanomaterials and their applications in nanoelectronics, energy storages, and bioelectronics. Our passion lies in the discovery, understand and application of new paradigms to enable next generation devices and systems that can address societal needs.

2017 update:

Our work of 2D MoS_2/Li-metal in Li–S batteries is published in **Nature Nanotechnology** (February 12, 2018), https://doi.org/10.1038/s41565-018-0061-y

UNT Press Release: https://engineering.unt.edu/news/researchers-create-lithium-ion-replacement
https://research.unt.edu/material-could-lead-next-generation-ultra-thin-electronic-devices?utm_source=UNTResearchNewsletter-Jan2018

EDUCATION

Ph.D. 1997 Department Material Science & Engineering North Carolina State University
M.S. 1988 Material Science & Engineering, Hanyang University, Seoul, Korea
B.S. 1986 Department of Metallurgical Engineering, Hanyang University, Seoul, Korea

PROFESSIONAL EMPLOYMENT:

July 2012 - Present, Professor University of North Texas
August 2011- July 2012, Professor, Florida International University
2008 - 2012 Adjunct Professor, Energy Engineering Dept., Hanyang University
June 2003 - July 2011, Associate Professor, Florida International University (Tenured)
March 1998 - June 2003, Senior Researcher & Project Manager, Samsung SAIT, Korea
March 1997 - March 1998, Post Doctoral Researcher
Feb. 1988 - July 1993, Research Scientist, Materials Lab., Agency for Defense Development, Korea

WonBong Choi, *Ph.D.*, Dr. WonBong Choi is a tenured, full professor in the Department of Materials Science and Engineering at University of North Texas, Denton. He joined the department in July 2012 after his work in Florida International University (FIU) as a tenured full professor. *He* joined FIU as an Associate Professor in the Mechanical and Materials Engineering Deptartment in June 2003. Dr. Choi obtained his Ph.D in Materials Science and Engineering from the North Carolina State University (NCSU) in 1997. In period spanning from 1988 to 1993, he worked as a Research Scientist at Agency Defense & Development in fine ceramic-metal composites materials. After his PhD, Dr. Choi worked in the industry research laboratory as a senior researcher and project manager at Samsung (SAIT). He was a leading scientist in the "*Carbon Nanotubes for Tera-level Nano electronics Device*" project with more than $1.0 M/year support from SAMSUNG and the Government of Korea. He was also

involved in the field emission display project at SAMSUNG (SAIT), leading the team investigating the carbon nanotube flat panel display.

Choi has been awarded the prestigious Materials Research Society (MRS) Medal for 2006 "for important developments in the materials science and applications of carbon nanotubes". Dr. Choi awarded MRS fellow as the youngest person named as a Fellow in 2009; the title of MRS Fellow honors members of the Materials Research Society who are notable for their distinguished research accomplishments and their outstanding contributions to the advancement of materials research, world-wide. The maximum number of new Fellow appointments each year is limited to 0.2% of the current MRS membership.

One of the remarkable achievements in his research career was the invention of "Carbon Nanotube Field Emission Display", which was reported in *Science* and was covered extensively by news media around the world. His work has led to a recent demonstration by SAMSUNG of over *40-inch field emission flat panel display*. In addition, Dr. Choi is credited to developing the single molecular DNA-sensor, high efficiency Li-ion battery based on carbon nanotubes, grapheme based flexible field emission display, vertical CNT-Field Effect Transistor and CNT based non-volatile memory devices. He has been involved in various cooperative projects such as dye sensitized solar cells, Li-ion battery and lab-on-a-chip to name a few. His innovations, reported as news in the TRN News (January 2002), MIT's Magazine (June 2003), Analytical Chemistry (2006), Nanowerk (2007), Nature Nanotechnology (2008) and TMS (2011), were the first to show some practical ways of making nanomaterials based devices.

He has successfully conducted numerous granted projects in the domain of nanotechnology funded by AFOSR, DARPA, NSF, SRC, DOE and Samsung. Dr. Choi is the author/co-author of over 70 patents, 1 book ("GRAPHENE" CRC Press 2011), 11 book chapters, over 220 publications, which includes 140 peer-reviewed journal articles and 80 conference proceedings. His research articles have been cited over 11,000 times with H-index of 51 (Google Scholar). He has been invited to share his technological findings and knowhow at many international conferences, MRS, TMS, IEEE, SPIE, APS and so on. He has served as a chair/committee member for several international meetings including MRS, IEEE-Nano, TMS-Nano symposium and US-Korea meetings. He serves as a reviewer for more than 20 international journals and also serves on the Editorial Board of 5 journals including the Topical editor of Current Applied Physics (Elsevier).

RECOGNITION

- Faculty Honor Recognition for Honors Day 2016, UNT Honors College
- **MRS Fellow;** selected for recognition with the distinguished title of Materials Research Society Fellow in 2009 (the youngest MRS Fellow)
- FIU Excellence in Faculty Scholarship 2008, *Florida International University (Honored by FIU President on April 2nd 2008 as a distinguished faculty member for the outstanding accomplishments in research and scholarship.*
- **Materials Research Society (MRS) Medal(2006)** "for important developments in the material science and applications of carbon nanotubes"
- Distinguished Research Award, Executive Dean's Award, Florida International University, 2006
- Recognition of outstanding lecture on Trends in Emerging Technologies and Education, Florida International University, Fall 2004

- Dr.Choi's work were highlighted in: Science (1999), TRN News (January 2002), MIT's Magazine (June 2003), Analytical Chemistry (2006), Nanowerk (2007), Nature Nanotechnology (2008), TMS (2011)
- Received an Honor Letter from the editor of AIAA,
  AIAA (American Institute of Aeronautics and Astronautics), Organizer of Conference of Micro-Nano-Technologies for Aerospace Applications (CANEUS), Monterey CA, 2004 Presenting Invited Talk at International Conferences during year 2004
- The *Best Paper of the Year*, SAMSUNG (SAIT), 2002
- The *Best Patent of the Year 2001*, SAMSUNG (SAIT), 2002
- *Gold Technology Award* from SAMSUNG (for carbon nanotube field emission display development), 1998
- Recognition of National R&D Evaluation Committee, 2002-2003 Awarded by Minister of Korean Ministry of Science and Technology.
- Student poster award, The Fourth Annual Symposium on Advances in Microscopy, 1995
- *Gold Technology Award* from Agency for Defense and Development, Government of Korea (for special ceramic composites development), 1993

RESEARCH INTERESTS

- Nanomaterials Synthesis (2D materials (MoS_2, $MoSe_2$, WS_2), Graphene, Carbon Nanotubes, Nanowires)
- Ubiquitous (nano) Electronics (FET, flexible electronics)
- Micro/Nanoscale Fabrication
- Nano energy storages (Batteries: Li-ion, Li-S, flexible, Dye sensitized Solar Cells, Field emission based energy system)
- Nano-bio Electronic Sensors (DNA, Enzymatic, NO)

PROFESSIONAL ACTIVITIES

- **Editor-in-Chief**, Nanoscience and Technology: An International Journal
- **Topical Editor** of Current Applied Physics (Elsevier), 2011-2013
- International Advisory Board, International Symposium in Nanotechnology in Environmental Protection and pollution, (ISNEPP 2007), December 10-12 2007
- **Editorial Board** of Science of Advanced Materials Journal(American Scientific Publisher);
- **Editor** of Materials Science Research (IOS Publishing)
- **Editorial Advisory Board** of Recent Patents on Nanotechnology, BENTHAM SCIENCE PUBLISHERS LTD
- **Editorial Advisory Board** of The Open Nanoscience Journal , BENTHAM SCIENCE PUBLISHERS
- Chair of the TMS meeting Nanomaterials Symposium, 2007 and 2008
- Chair of the NSF US-Korea Micro and Nano Integrated Complex Systems Workshop, October 2005
- NSF Panel Reviewer, 2005-2006, 2010
- Served as a co-chair of AFOSR sponsored US-KR Nanoelectronic/nanomaterilas Workshop, 2005-2010; Session chair of IEEE-NDSI Workshop, June 2004; Session chair of SMEC Conference, February 2005

- Co-Chair of the MRS meeting, Carbon Nanomaterials Symposium, Fall 2012
- Chair, Symposium of Beyond graphene-2D Materials and applications, Fall 2015 MRS Meeting
- Organizing Committee of NanoKorea 2012
- Co-chair of NanoKorea Nanomaterials Symposium, 2013
- Paper Reviewer; Diamond and Related Materials, American Chemical Society, Applied Physics Letter, IEEE, JVST B
- Organizing committee, IEEE-Nano 2010
- Organizing Committee, 9th Pacific Rim International Conference on Advanced Materials and Processing (PRICM9), 2015-2016
- Editor of ECS Transactions, Volume 77, Issue 11 231st ECS Meeting May 28, 2017 - June 1, 2017, New Orleans, LA

PAPERS IN ARCHIVAL JOURNALS (Citation > 11,000, H index=51 (Google Scholar) from over 230 publications; 1 book and 11 book chapters, ~80 patents)

1. Phase transformed atomic layer of MoS_2 as lithium protective layer for high performance lithium sulfur batteries, Cha, E., Patel, M.D., Park, J., Hwang, J., Prasad, V., Cho, K., and Choi, W., ***Nature Nanotechnology*** February 12, 2018 (https://doi.org/10.1038/s41565-018-0061-y)

2. In-Situ Fabrication of Graphene-Coated Three-Dimensional Nickel Oxide Anode for High-Capacity Lithium-Ion Batteries, Chiwon Kang, Eunho Cha, Wonbong Choi, **RSC Advances** 8, 7414, 2018

3. Composition-tunable synthesis of large-scale $Mo_{1-x}W_xS_2$ alloys with enhanced photoluminescence, Juhong Park, Min Su Kim, Bumsu Park, Sang Ho Oh, Jeongyong Kim, and Wonbong Choi, **ACS Nano** (under review) 2017

4. Synthesis of uniform single layer WS_2 for tunable photoluminescence, Juhong Park, Min Su Kim, Eunho Cha, Jeongyong Kim & Wonbong Choi, **(Nature) Scientific Reports**, 7, 16121 DOI:10.1038/s41598-017-16251-2 (2017)

5. A binder free and high sulfur loaded three-dimensional carbon nanotubes electrode for high performance Li-S Batteries, Mumukshu D. Patel, Eunho Cha, Wonbong Choi, 77 (11) 437-445 **ECS Transactions** (2017)

6. Directly Deposited Porous Two-Dimensional MoS_2 Films as Electrocatalysts for Hydrogen Evolution Reactions, Mumukshu D. Patel, Jibo Zhang, Juhong Park, Nitin Choudhary, James M. Tour, and Wonbong Choi, **Materials Letters** (2017) (Under review)

7. High performance rechargeable Li-S batteries using binder-free large sulfur-loaded three-dimensional carbon nanotubes, Mumukshu D. Patel, Eunho Cha, Chiwon Kang, Bharat Gwalani, Wonbong Choi, 118, 120-126 (2017) **Carbon** http://dx.doi.org/10.1016/j.carbon.2017.03.035

8. Raman and X-ray Photoelectron Spectroscopy Investigation of the Effect of Gamma-Ray Irradiation on MoS_2, Burcu Ozden, Min P. Khanal, Juhong Park, Sunil Uprety, Vahid Mirkhani, Kosala Yapabandara1, Kyunghyuk Kim, Marcelo Kuroda, M. J. Bozack, Wonbong Choi, and Minseo Park, **Micro & Nano Letters**, (2016) DOI: 10.1049/mnl.2016.0712

9. (Invited Review, Featured Paper) Three-Dimensional Carbon Nanostructures for Advanced Lithium-Ion Batteries, Chiwon Kang, Eunho Cha, Mumukshu D. Patel, H. Felix Wu, Wonbong Choi, (Invited Review Paper) **Journal of Carbon Research *C* 2016, *2*(4), 23; doi:10.3390/c2040023** (2016)

10. MoS_2-reinforced 3D carbon nanotubes for next generation Li-ion batteries, Mumukshu D. Patel, Eunho Cha, Nitin Choudharya, Chiwon Kang, Wonki Lee, Jun Yeon Hwang, Wonbong Choi, **Nanotechnology, 27 (2016) 495401**

11. Recent development of 2D materials and their applications, Wonbong Choi, Nitin Choudhary, Juhong Park, Deji Akinwande, Younghee Lee, **Materials Today,** 116-130, 20, (2017)

12. Wafer Scale Patterned Growth of Vertically Stacked Few Layer 2D MoS2/WS2 van der Waals Heterostructures, Nitin Choudhar, Juhong Park, Jun Yeon Hwang, Heesuk Chung, Kenneth H. Dumas, Saiful I. Khondaker, Wonbong Choi, Yeonwoong Jung, **Scientific Report (Nature)** 6, 25456 (2016)

13. Pine Wood Extracted Activated Carbon through Self-Activation Process for High-Performance Lithium-Ion Battery, Changlei Xia, Chiwon Kang, Mumukshu D. Patel, Liping Cai, Bharat Gwalani, Raj Banerjee, Sheldon Q. Shi,and Wonbong Choi, **Sustainable Chemistry,** 4000-4007, 1, 2016

14. Thermal conductivity measurement of few layer graphene film by a micropipette sensor with laser point heating source, JY Jeong, KM Lee, R Shrestha, K Horne, S Das, W Choi, M Kim, TY Choi, **Materials Research Express** 3 (5), 055004, 2016

15. Three-dimensional free-standing carbon nanotubes for a flexible lithium-ion battery anode Chiwon Kang , Eunho Cha , Rangasamy Baskaran and Wonbong Choi, **Nanotechnology** 27 (2016) 105402

16. Synthesis of large scale MoS_2 for electronics and energy applications, Nitin Choudhary, Mumukshu Patel, Juhong Park, Ben Sirota, Wonbong Choi, **Jr. of Materials**, 31(7), April 14, 2016.

17. Directly deposited MoS2 thin film electrodes for high performance supercapacitors, N. Choudhary, M. Patel, Y Ho, N. Dahotre, J. Hwang, W. Choi, **Jr. Materials Chemistry** A (2015) DOI: 10.1039/C5TA08095A

18. Three-dimensional carbon nanotubes for high capacity lithium-ion batteries, Chiwon Kang, Mumukshu Patel, Baskaran Rangasamy, Kyu-Nam Jung, Changlei Xia, Sheldon Shi, Wonbong Choi, **Jr. Power Sources**, 299 465-471 (2015)

19. Highly Sensitive Wide Bandwidth Photodetector Based on Internal Photoemission in CVD Grown p-Type MoS2/Graphene Schottky Junction, PhaniKiran Vabbina, Nitin Choudhary, Al-Amin. Chowdhury, Raju Sinha, Mustafa Karabiyik, Santanu Das, Wonbong Choi, and Nezih Pala, ***ACS Appl. Mater. Interfaces***, *7* (28), pp 15206–15213, July 13, 2015

20. “Unusually High Optical Transparency in Hexagonal Nano-Patterned Graphene with Enhanced Conductivity by Chemical Doping” Duyoung Choi, Cihan Kuru, Chulmin Choi, Kunbae Noh, Sookhyun Hwang, Wonbong Choi and Sungho Jin, 11, 3143-3152 **Small** (2015).

21. Thickness modulated CVD-grown MoS2 for transparent and flexible electronic devices, Juhong Park, Nitin Choudhary, Jesse Smith, Gilsik Lee, Moonkyung Kim, and Wonbong Choi, **Applied Physics Letters**, 106 012104 (2015) doi: 10.1063/1.4905476

22. “Field emission with ultralow turn on voltage from metal decorated carbon nanotubes”, Sridhar S1, Tiwary C, Vinod S, Taha-Tijerina JJ, Sridhar S, Kalaga K, Sirota B, Hart AH, Ozden S, Sinha RK, Harsh, Vajtai R, Choi W, Kordás K, Ajayan PM. **ACS Nano**, 2014 8(8):7763-70. doi: 10.1021/nn500921s. (2014)

23. Growth of Large Scale and Thickness-Modulated MoS_2 Nanosheets, Nitin Choudhary, Juhong Park, Junyeon Hwang, Wonbong Choi, ***ACS Appl. Mater. Interfaces,*** *6* (23), pp 21215–21222 (2014)

24. “Nano Patterned Graphene Field Effect Transistor Fabricated using Block Copolymer Lithography” Duyoung Choi, Cihan Kuru, Chulmin Choi, Kunbae Noh, Soon-Kook Hong, Santanu Das,Wonbong Choi and Sungho Jin, **Materials Research Letters,** 2(3) 131-139 (2014).

25. Synergistic metal-metal oxide nanoparticles supported electrocatalytic graphene for improved photoelectrochemical glucose oxidation, Devadoss, A., Sudhagar, P., Das, S., Lee, S.Y., Terashima, C., Nakata, K., Fujishima, A.,Choi, W., Paik, U., **ACS Applied Materials and Interfaces** 6 (7) , pp. 4864 (2014)

26. Interfacial bonding characteristics between graphene and dielectric substrate, Santanu Das, Debrupa Lahiri, Arvind Agarwal and Wonbong Choi, **Nanotechnology** 25 045707 (2014)

27. Si quantum dots wrapped by graphene as multi layered thin films for lithium- ion battery, Rangasamy Baskaran, Wonbong Choi, **Carbon** 77 1065-1072 **(**2014)

28. Large Scale Patternable 3D Carbon Nanotubes-Graphene Structure for Flexible Li-ion Battery, Chiwon Kang, Rangasamy Baskaran, Junyeon Hwang, Bon-Cheol Ku,Wonbong Choi, **Carbon** 68. 493-500 (2014)

29. Controlled Synthesis of ZnO Nanoflakes on Arbitrary Substrates at Ambient Conditions, Phani Kiran Vabbina, Nezih Pala, Santanu Das, WonBong Choi, **Particle and Particle Systems Characterization** 31 (2) , pp. 190 (2014)

30. Growth of Junctions in 3D Carbon Nanotube-Graphene Nanostructures: A Quantum Mechanical Molecular Dynamic Study, Jianbing Niu, Mingtao Li, Wonbong Choi, Liming Dai, and Zhenhai Xi, **Carbon**, 67 627 (2014)

31. Synthesis, Properties and Applications of 2-D Materials: A Comprehensive Review, Santanu Das, Moonkyung Kim, Jo-won Lee and Wonbong Choi, **Critical Reviews in Solid State and Materials Sciences** 231 39 (2014)

32. Graphene synthesis and application for solar cells, Santanu Das, P. Sudhagar, Y. S. Kang and Wonbong Choi, **Jr. of Materials Research** 29 (3) 299 (2014)

33. Improving High Frequency Characteristics of Graphene FETs by Field Controlling Electrodes, C. Al-Amin, P.K. Vabbina, M. Karabiyik, R. Sinha, N.Pala, W.Choi, **IEEE Electron Device Letters**, 34, 1193, (2013).

34. "Measurements of the adhesion energy of graphene to metal substrates", Santanu Das, D. Lahiri, Dong-Yoon Lee, Arvind Agarwal and Wonbong Choi, **Carbon** 59, 121-129, (2013)

35. Zheng Yan, Lulu Ma, Yu Zhu, Indranil Lahiri, Zheng Liu, Myung Gwan Hahm, Shubin Yang, Changsheng Xiang, Wei Lu, Zhiwei Peng, Zhengzong Sun, Jun Lou, Wonbong Choi, Pulickel M. Ajayan, James M. Tour, *Three-dimensional carbon nanotube-graphene hybrids on porous nickel films for device fabrication*. **ACS Nano** 7, 58-64 (2013)

36. Indranil Lahiri, Wonbong Choi, *Carbon Nanostructures in Lithium Ion Batteries: Past, Present and Future***. (Invited Review) Critical Reviews in Solid State and Materials Sciences, 128-166,** Volume 38, 2013

37. Santanu Das, P. Sudhagar, Eisuke Ito, Dong-yoon Lee, S.Nagarajan, Yong Soo Kang, and Wonbong Choi, "Effect of HNO_3 functionalization on large scale graphene for enhanced tri-iodide reduction in dye-sensitized solar cells" **Journal of Materials Chemistry**, **22**, 20490-20497 (2012)

38. Santanu Das, P. Sudhagar, S Nagarajan, E Eto, S Y Lee, Yong Soo Kang and WonBong Choi: Synthesis of CoS decorated large scale graphene film for high efficiency solar energy conversion: **Carbon**, 50, 4815, (2012).

39. Indranil Lahiri, Joyce Wong, Zilu Zhou, Wonbong Choi, *Ultra-high current density multiwall carbon nanotube field emitter structure on three-dimensional micro-channeled copper*. **Appl. Phys. Lett.** 101, doi: 10.1063/1.4745010 (2012)

40. Chiwon Kang, Indranil Lahiri, Rangasamy Baskaran, Jun Y. Hwang, Won-Gi Kim, Yang-Kook Sun, Rajarshi Banerjee, Wonbong Choi, *Multiwall Carbon Nanotube Based Anodes on 3D Current Collector for Li-Ion Batteries***. Journal of Power Sources** 219, 364 (2012)

41. Debrupa Lahiri, Santanu Das, Arvind Agarwal and Wonbong Choi Unfolding the Damping Behavior of Multilayer Graphene Membrane in Low Frequency Regime: **ACS Nano, 6, 3992, 2012**
42. Protein-carbon nanotube sensors: Single platform integrated micro clinical lab for monitoring blood analytes,Viswanathan, S., Li, P., Choi, W., Filipek, S., Balasubramaniam, T.A., Renugopalakrishnan, V., Methods in Enzymology 509 , pp. 165 (2012)

43. "Amplifying Charge Transfer Characteristic of Graphene for Triiodide Reduction in Dye-Sensitized Solar Cells", S. Das, P. Sudhagar, D. H. Song, E. Eto, S. Y. Lee, Y. S Kang and WonBong Choi, **Adv. Func. Mater.,** *21, 3729-3736 (***2011)**

44. *Interface control: A modified rooting technique for enhancing field emission from multiwall carbon nanotube based bulk emitters*, Indranil Lahiri, Wonbong Choi, **Acta Materialia**, 59, 2011, 5411-5421.

45. Ultra-high current density multiwall carbon nanotube field emitter structure on three-dimensional micro-channeled copper, Indranil Lahiri, Wonbong Choi, **Acta Mater., 2011, 59, 5411-5421**.

46. Ultrathin alumina coated carbon nanotubes as negative electrodes for high capacity and safe Li-ion battery, Indranil Lahiri, Seung-Min Oh, Jun Y. Hwang, Chiwon Kang, Hyeongtag Jeon, Rajarshi Banerjee, Yang-Kook Sun, Wonbong Choi, **J. Mater. Chem.,21, 13621, (2011)**

47. Application of Carbon nanostructures—energy to electronics, Indranil Lahiri, Santanu Das, Chiwon Kang, and Wonbong Choi**, Journal of Metal**, Vol. 63 No. 6 (2011)

48. Synthesis and characterization of self-organized multilayered graphene-carbon nanotube hybrid films, Santanu Das,a Raghunandan Seelaboyina,a Ved Verma,a Indranil Lahiri,a Jun Yeon Hwang,b Rajarshi Banerjeeb and Wonbong Choi** ***J. Mater. Chem*., 2011, 21 (20), 7289 – 7295**

49. Dye-sensitized solar cells using graphene-based carbon nano composite as counter electrode Hyonkwang Choi, Hyunkook Kim, Sookhyun Hwang, Wonbong Choi, Minhyon Jeon, **Solar Energy Materials and Solar Cells,** Volume 95, Issue 1, Pages 323–325 (2011)

50. Tuning electrical conductance of serpentine single-walled carbon nanotubes, Jun Huang, Bei Wang, Indranil Lahiri, Awnish K. Gupta, Peter C. Eklund and Wonbong Choi, **Advanced Functional Materials**, **20** 4388 (2010)

51. Carbon Nanotubes: How strong is their bond with the substrate?, Indranil Lahiri, Debrupa Lahiri, Sungho Jin, Arvind Agarwal, Wonbong Choi, **ACS Nano 4**, 3440 (2010)

52. An all-graphene based transparent and flexible field emission device, *Indranil Lahiri, Ved Prakash Verma, Wonbong Choi,* **Carbon 49. 1614** *(2010)*

53. Large-area graphene on polymer film for flexible and transparent anode in field emission device, Ved Prakash Verma, Santanu Das, Indranil Lahiri and Wonbong Choi, **Appl. Phys. Lett. 96** 203108 (2010)

54. High-capacity, long-cycle stability of lithium ion battery anode using interface-controlled binder-free MWCNT grown on copper, Indranil Lahiri, Sung-Woo Oh, Jun Y. Hwang, Sungjin Cho, Yang-Kook Sun, Raj Banerjee, Wonbong Choi, **ACS Nano, 4 3440 (2010)**

55. Effect of Bending Radius on the Resistivity and Raman Spectrum of Single-Walled Carbon Nanotubes, Bei Wang, Jun Huang, P. Eklund, W. Choi, **Physical Review B**, 81, 115422 (2010)

56. The Raman spectroscopic studies of aligned MWCNTs treated under high pressure and high temperature, Srinija Repalle, JiuhuaChen, Vadym Drodz, Wonbong Choi, **Journal of Physics and Chemistry of Solids** (2010), 71 1150–1153 (2010)

57. (Invited Paper) Synthesis of Graphene and Its Applications: a review W. Choi, I. Lahiri, R. Seelaboyna, Y. Kang , **Critical Reviews in Solid State and Materials Sciences, 35, 52-71 (2010**)

58. Enhanced field emission from multi-walled carbon nanotubes grown on pure copper substrate, Indranil Lahiri, Raghunandan Seelaboyina, Jun Y. Hwang, Raj Banerjee and Wonbong Choi, **Carbon 48, 1531-1538 (2010)**

59. Fabrication of Nanoelectrodes using Individual Multi-walled Carbon Nanotubes and Their Cyclic Voltammetric Properties" Sookhyun Hwang, Harindra Vedala, Taehyung Kim, Hyonkwang Choi, Wonbong Choi, Minhyon Jeon, **Journal of The Electrochemical Society, 157 (4) (2010)**

60. Fabrication and Electrochemical Characterization of Multi-walled Carbon Nanotube Electrodes for Applications to Nano-electrochemical Sensing, Sookhyun Hwang, Harindra Vedala, Taehyung Kim, Wonbong Choi, Hyonkwang Choi and Minhyon Jeon, **Journal of the Korean Physical Society**, Vol. 56, 677-681 (2010)

61. Controlled Growth of Single-walled Carbon Nanotubes for Unique Nanodevices, Jun Huang, Unjeong Kim, Bei Wang, Indranil Lahiri, Eunhong Lee, Peter C. Eklund and Wonbong Choi, **Journal of Nanotechnology and Nanoscience, Vol. 10, 1-8, 2010**

62. Ultra-low concentration NO gas sensing by functionalized single zinc oxide nanowire", Ved P. Verma, Santanu Das, Sookhyun Hwang, Hyonkwang Choi, Minhyon Jeon, Wonbong Choi **Materials Science and Engineering B** (2010)

63. Carbon-nanotube-embedded novel three-dimensional alumina microchannel cold cathodes for high electron emission, Raghunandan Seelaboyina, Indranil Lahiri, Wonbong Choi , **Nanotechnology**, 21, 1452206 (2010)

64. "Intermediate temperature tribological behavior of carbon nanotube reinforced plasma sprayed aluminum oxide coating", **Surface Coatings and Technology journal**, Anup K. Keshri, J. Huang, W. Choi, A. Agarwal, 204, 1847-1855 (2010)

65. Chen-Zhong Li, Wonbong Choi, Cheng-Hsin Chuang, Size effects on the photoelectrochemical activities of single wall carbon nanotubes, **Electrochemica Acta** (2008)

66. S. Hwang, J. Moon, S. Lee, D.H. Kim, D. Lee, W. Choi and M. Jeon**,** *Carbon nanotubes as counter electrode for dye-sensitised solar cell, ,* ***Electronics Letters****, 43 (2007)*

67. Synthesis of aluminum oxide coating with carbon nanotube reinforcement produced by chemical vapor deposition for improved fracture and wear resistance, Anup K. Keshri, Jun Huang, Virendra Singh, Wonbong Choi, Sudipta Seal, Arvind Agarwal, **Carbon** 48, 431-442 (2010)

68. Harindra Vedala, Somenath Roy, Melissa Doud, Kalai Mathee and Wonbong Choi, *The effect of environmental factors on the electrical conductivity of a single oligo-DNA molecule measured using single-walled carbon nanotube nanoelectrodes*, **Nanotechnology 19** 265704,(2008)

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70. Ved Prakash Verma, Do-Hyun Kim, Hoonha Jeon, Minhyon Jeon and Wonbong Choi, *Characteristics of Low doped Gallium-Zinc Oxide Thin Film Transistors and effect of Annealing under High Vacuum,* **Thin Solid Films** 516 8736-8739 (2008)

71. Ved Prakash Verma, Hoonha Jeon, Sookhyun Hwang, Minhyon Jeon and Wonbong Choi, *Enhanced Electrical Conductance of ZnO Nanowire FET by Non-destructive Surface Cleaning* **IEEE Trans. Nano.** 7, 782-786 (2008)

72. Do-Hyun Kim, Hoonha Jeon, Geumchae Kim, Suejeong Hwangboe, Ved Prakash Verma, Wonbong Choi, Minhyon Jeon, *Comparison of the optical properties of undoped and Ga-doped ZnO thin films deposited using RF magnetron sputtering at room temperature,* **Optics Communication**, 281, 2120 (2008)

73. Hoonha Jeon, Ved Prakash Verma, Sookhyun Hwang, Sooyeon Lee, Chiyoung Park, Do-Hyun Kim, Wonbong Choi, and Minhyon Jeon; *Characteristics of Gallium-Doped Zinc Oxide Thin-Film Transistors Fabricated at Room Temperature Using Radio Frequency Magnetron Sputtering Method,* **Japanese Jr. Appl. Physics**, 47, No. 1, 2008, pp. 87–90,

74. Raghunandan Seelaboyina, Srinivasarao Bodepalli, Kyungseok Noh, Minhyon Jeon, Wonbong Choi, Enhanced field emission from aligned multistage carbon nanotube emitter arrays, **Nanotechnology**, 19, 065605 (2008)

75. S. ROY, H. VEDALA, A. ROY, D. KIM, M. DOUD, K. MATHEE, H. SHIN, N. SHIMAMOTO, V. PRASAD, W. CHOI, Electronic detection of single-molecule DNA hybridization using single-walled carbon nanotubes, **Nano Letters** 8, 26-30 (2008)

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77. *Recent Progress of Carbon Nanotube Field Emitters and Their Application, W. Choi, R. Seelaboyina, **Recent Patent in Nanotechnology**, 1, 238-244 (2007)*

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