# INDRANIL LAHIRI

**Assistant Professor**

Department of Metallurgical and Materials Engineering

Indian Institute of Technology Roorkee

Roorkee, Uttarakhand 247667, INDIA

Phone: (091) 1332 285261 (Off.); Fax: (091) 1332 285243 (Dept.)

E-mail: indranil.lahiri@gmail.com, indranil78@yahoo.com, indrafmt@iitr.ac.in


## Work Experience

- ***December, 2012 onwards:*** **Assistant Professor**, Department of Metallurgical and Materials Engineering**,** Indian Institute of Technology (IIT) Roorkee, INDIA
- ***September – October 2012:*** **Research Assistant Professor**, University of North Texas, Denton, TX, USA
- ***December 2011 – August 2012:*** **Post Doctoral Researcher**, Florida International University, Miami, FL, USA
- ***Spring 2008 – Fall 2011:*** **Graduate Research Assistant**, Florida International University, Miami, FL, USA (as PhD student)
- ***May 2005 – June 2007:*** **Senior Scientist**, NFTDC, Hyderabad, India
- ***May 2000 – April 2005:*** **Scientist**, NFTDC, Hyderabad, India

## Education

- **Ph.D,** Materials Science and Engineering, Florida International University (FIU), Miami, Florida, USA, Fall 2011
- **M.Tech.** (Master of Technology), Materials & Metallurgical Engineering, Indian Institute of Technology (IIT) Kanpur, India, May 2000
- **B.E.** (Bachelor of Engineering), Metallurgical Engineering, Bengal Engineering College, Shibpur, India, June 1998

## Teaching

### 2013 onward (in IIT Roorkee)

- **MT-531:** Electronic Materials (M. Tech. and Ph.D. students) – Autumn 2014
- **MT-201A**: Materials Science and Engineering (2$^{nd}$ Year Undergrad.) – Autumn 2013
- **MT-220**: Materials Characterization Lab.-II (2$^{nd}$ Year Undergrad.) – Autumn 2013
- **MT-210**: Materials Characterization Lab.-I (2$^{nd}$ Year Undergrad.) – Autumn 2013

- **MT-402**: Mechanical Working of Metals, MMED (4th Year Undergrad.) – Spring 2013, Spring 2014, Spring 2015
- **MT-490**: Practical Training, MMED (4th Year Undergrad.) – Spring 2013
- **NT-512**: Technology of Nanostructure Fabrication, Centre of Nanotechnology (M. Tech. and PhD) – Spring 2013, Spring 2014, Spring 2015

### Until 2012

- **EGN 3365**: Materials Engineering (undergraduate) - Spring 2012, FIU, USA
- **EGN 3365**: Materials Engineering (undergraduate) – Special lectures on selected topics (in the classes of Dr. W. Choi) – Fall and Spring, 2009-2011, FIU, USA
- Free tutorship (for Material Advantage chapter in Florida International University) to undergraduate students in Materials Engineering – Fall and Spring, 2009-2011, FIU, USA

## Administrative Responsibilities (at IIT, Roorkee)

- Principal Investigator, Nanomaterials and Applications Lab., Metallurgical and Materials Engineering
- Officer-in-charge, Nanomaterials Lab., Centre of Nanotechnology
- Officer-in-charge, Annual Reports, Metallurgical and Materials Engineering
- Additional Officer-in-charge, Time Table, Metallurgical and Materials Engineering
- Additional Officer-in-charge, Energy Materials Lab., Metallurgical and Materials Engineering
- Additional Officer-in-charge, Metal Forming Lab., Metallurgical and Materials Engineering
- Additional Officer-in-charge, Materials Engineering Lab., Metallurgical and Materials Engineering
- Additional Officer-in-charge, Materials Testing Lab., Metallurgical and Materials Engineering
- Member, Department Academic Committee, Metallurgical and Materials Engineering
- Member, Faculty Search Committee, Metallurgical and Materials Engineering
- Member Secretary, Department Faculty Committee, Metallurgical and Materials Engineering

## Research Interests

- **Carbon nanotubes** – Large-scale synthesis of carbon nanotubes on different metallic, semiconducting and insulating substrates, their electronic applications (as field electron emitter) and electrochemical application (as electrodes in batteries, super-capacitors).
- **Graphene** – Large-scale synthesis; applications for flexible, transparent field emitters and other transparent, conducting electrodes.
- **Field emission** – Application of C-nanostructures for fabrication of field emission devices, for possible application in high power microwave generators and displays.
- **Energy storage devices** – Development of new electrode materials for next-generation high-capacity Li-ion batteries and supercapacitors.

- **Materials for energy generation** – Development of new materials for energy generation systems like solar cells

## Other Research Experience

- Functionally gradient materials
- Mechanical alloying, powder metallurgy
- Superplasticity, deformation processing of metals and alloys
- X-ray diffraction, line profile analysis, SEM, AFM
- Materials testing and characterization, destructive and non-destructive testing, microscopy, image analysis
- Alloy, process and product development, thermo-mechanical processing
- Processing and characterization of various non-ferrous alloys

## Honours & Achievements

- Winner of ***2012 ASM International Student Paper Contest*** by **ASM International** (awarded during MS&T 2012, Pittsburgh, PA, USA, Oct. 7-11, 2012).
- Won ***TMS Student Best Paper Contest 2011 – Graduate Level – 2nd Place*** (awarded during TMS 2012 Annual Meeting, Orlando, FL, Mar. 11-15, 2012).
- Awarded ***Graduate Excellence in Materials Science (GEMS) Award 2011-Saphire*** by Basic Science Division, ***American Ceramic Society*** (awarded during MS&T 2011, Columbus, OH, USA, Oct. 16-20, 2011). (ACerS Bulletin, Vol. 91, No. 1, January 2012, p. 8)
- Awarded **Second prize** in ***The Best Junior Researcher Award in 2011 Nanomaterials Symposium***, **TMS 2011**, San Diego, USA, 27 Feb -3 March, 2011.
- Awarded "**Best Doctoral Graduate**" among all departments of College of Engineering, Florida International University, in Fall 2011 Commencement, Dec. 12, 2011.
- Recipient of **Dissertation Year Fellowship, FIU**, Spring-Fall 2011.
- Recipient of **Doctoral Evidence Acquisition Fellowship, FIU**, Summer-Fall 2010.
- Selected as Student Board Member in **ASM International - Board of Trustees, 2010-11**. (http://www.asminternational.org/content/docs/Lahiri.pdf)
- **Travel Grants** to present in conferences:
  - *Attendee-Assistance Support* from the organizers of 2011 Nanoelectronic Devices for Defense & Security (NANO-DDS) Conference, Aug. 29- Sept. 2, 2011, Brooklyn, NY, USA
  - *Student Travel Grant* from TMS – Electronic, Magnetic, & Photonic Materials Division, TMS 2011 Annual Meeting, San Diego, USA, 27 Feb -3 March, 2011
  - *Student Travel Grant* from Electro Chemical Society (ECS) – Battery Division, 218th ECS Meeting, Las Vegas, USA, 10-15 October, 2010
  - *Conference Travel Awards* from Student Government Association, FIU for

- TMS 2009
- MRS Fall 2009
- MS&T 2011

❖ **5 Awards in events** organized by Material Advantage - FIU chapter

❖ Included in *Marquis' Who's Who in the World*, 2009.

# Publications

## Summary:

***US Provisional Patent Applications – 2***

***Book Chapters – 3***

***Journal Articles – 27***

***Peer-Reviewed Conference Proceedings – 6***

***Conference Presentations – 49***

***h index – 11 (scopus.com)***

***Total citations – 632 (scopus.com)***

## Patents

2. W. Choi, **I. Lahiri**, C. Kang, *High efficiency lithium ion battery anode based on 2- and 3-dimensional carbon nanotube-metal/alloy substrates*, **US Provisional Patent Appl. No. 61567979** (Filed on December 7, 2011).
1. W.B. Choi, S.J. Cho, **I. Lahiri,** *High efficiency lithium ion battery anode using interface-controlled binder-free carbon nanotubes grown on metal/alloy substrates*, **US Provisional Patent Appl. No. 61/222,481** (Filed on July 2, 2009).

## Book Chapters

3. **Indranil Lahiri**, Wonbong Choi, *Field emission and graphene: An overview of current status*, In **"Graphene: Synthesis and applications"** Ed. W. Choi, J.-W. Lee, CRC Press (Boca Raton, USA), January 2012, **ISBN:** 9781439861875, pp. 263-290.
2. **Indranil Lahiri**, Wonbong Choi, *Graphene and graphene based materials in solar cell application*, In **"Graphene: Synthesis and applications"** Ed. W. Choi, J.-W. Lee, CRC Press (Boca Raton, USA), January 2012, **ISBN:** 9781439861875, pp. 291-312.
1. **Indranil Lahiri**, *Microstructural Characterization of Mechanically Alloyed Powder by X-ray Diffraction and Atomic Force Microscopy: A case study with Cu-Cr*, In **"Advances in Materials Science Research. Vol. 3"**, Ed. M.C. Wythers, Nova Science Publishers, Inc. (NY, USA), April 2011, **ISBN:** 978-1-61728-998-9, pp. 183-203.

## Journals (Published/Accepted)

### 2014

27. Gaurav Mittal, **Indranil Lahiri**, *Recent progress in nanostructured next-generation field emission devices*. **Journal of Physics D: Applied Physics**, 47, 2014, 323001. ***(Impact Factor: 2.528)***

### 2013

26. Zheng Yan[†], Lulu Ma[†], Yu Zhu[†], **Indranil Lahiri**, Myung Gwan Hahm, Zheng Liu, Shubin Yang, Changsheng Xiang, Wei Lu, Zhiwei Peng, Zhengzong Sun, Carter Kittrell, Jun Lou, Wonbong Choi, Pulickel M. Ajayan, James M. Tour, *Three-dimensional metal-graphene-nanotube multifunctional hybrid materials*. **ACS Nano**, 7(1), 2013, 58-64. ***(Impact Factor: 11.421)***
25. **Indranil Lahiri**, Wonbong Choi, *Carbon Nanostructures in Lithium Ion Batteries: Past, Present and Future*. **Critical Reviews in Solid State and Materials Sciences**, 38, 2013, 128-166. ***(Impact Factor: 9.467)***
***http://www.tandfonline.com/eprint/8aBTAbfxZyYxHrn9vmEM/full***

### 2012

24. **Indranil Lahiri**, Joyce Wong, Zilu Zhou, Wonbong Choi, *Ultra-high current density multiwall carbon nanotube field emitter structure on three-dimensional micro-channeled copper*, **Applied Physics Letters**, 101, 2012, 063110 (5 pages). **(Impact Factor: 3.844)**
23. Chiwon Kang[#], **Indranil Lahiri**[#] ([#]equal contributors), 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*, *2012*, *364-370*. **(Impact Factor: 4.951)**

### 2011

22. **Indranil Lahiri**, Seung-Min Oh, Jun Y. Hwang, Chiwon Kang, Hyeongtag Jeon, Rajarshi Banerjee, Yang-Kook Sun, Wonbong Choi, *Ultrathin alumina coated carbon nanotubes as negative electrodes for high capacity and safe Li-ion battery,* **Journal of Materials Chemistry**, 21, 2011, 13621-13626. ***(Impact Factor: 5.968)***
21. **Indranil Lahiri**, Wonbong Choi, *Interface control: A modified rooting technique for enhancing field emission from multiwall carbon nanotube based bulk emitters*, **Acta Materialia**, 59, 2011, 5411-5421. ***(Impact Factor: 3.755)***

20. **Indranil Lahiri**[#], Debrupa Lahiri[#] ([#]equal contributors), Sungho Jin, Arvind Agarwal, Wonbong Choi, *Carbon Nanotubes: How strong is their bond with the substrate?*, **ACS Nano**, 5(2), 2011, 780-787. ***(Impact Factor: 11.421)***
    Highlighted as spotlight in "**Nanowerk**" (http://www.nanowerk.com/spotlight/spotid=19707.php)
19. **Indranil Lahiri**, Ved Prakash Verma, Wonbong Choi, *An all-graphene based transparent and flexible field emission device*, **Carbon**, 49 (5), 2011, 1614-1619. ***(Impact Factor: 5.378)***
18. **Indranil Lahiri**, Santanu Das, Chiwon Kang, Wonbong Choi, *Application of carbon nanostructures – Energy to electronics*, **JOM**, 63(6), 2011, 70-76. ***(Impact Factor: 1.421)***
17. Santanu Das, Raghunandan Seelaboyina, Ved Verma, **Indranil Lahiri**, Jun Yeon Hwang, Rajarshi Banerjee, Wonbong Choi, *Synthesis and Characterization of Self-Organized Multilayered Graphene-Carbon Nanotube Hybrid Films*, **Journal of Materials Chemistry**, 21, 2011, 7289-7295. ***(Impact Factor: 5.968)***
16. Jun Huang, Unjeong Kim, Bei Wang, **Indranil Lahiri**, Eunhong Lee, Peter C. Eklund, Wonbong Choi, *Controlled Growth of Single-walled Carbon Nanotubes for Unique Nanodevices*, **Journal of Nanoscience and Nanotechnology,** 11(1), 2011, 262-269. ***(Impact Factor: 1.563)***

## 2010

15. **Indranil Lahiri**, Sung-Woo Oh, Jun Y. Hwang, Sungjin Cho, Yang K. Sun, Rajarshi Banerjee, Wonbong Choi, *High capacity and excellent stability of lithium ion battery anode using interface-controlled binder-free multiwall carbon nanotubes grown on copper*, **ACS Nano**, 4(6), 2010, 3440-3446. ***(Impact Factor: 11.421)***
14. **Indranil Lahiri**, Raghunandan Seelaboyina, Jun Y Hwang, Raj Banerjee, Wonbong Choi, *Enhanced field emission from multi-walled carbon nanotubes grown on pure copper substrate*, **Carbon**, 48 (5), 2010, 1531-1538. ***(Impact Factor: 5.378)***
13. **Indranil Lahiri**, *Prospects of oxide materials in Li-ion batteries*, **American Ceramic Society Bulletin**, 89 (6), 2010, 17-18. ***(Impact Factor: 0.522)***
12. Jun Huang, Bei Wang, **Indranil Lahiri**, Awnish K. Gupta, Peter C. Eklund, Wonbong Choi, *Effect of bending on the resistivity and Raman spectrum of single-walled carbon nanotubes*, **Advanced Functional Materials,** 20, 2010, 4388-4393. ***(Impact Factor: 10.179)***
11. Ved Prakash Verma, Santanu Das, **Indranil Lahiri**, Wonbong Choi, Large-area graphene on polymer film for flexible and transparent anode in field emission device, **Applied Physics Letters**, 96 (20), 2010, 203108 (1-3). Also published in *Virtual Journal of Nanoscale Science and Technology*, Vol. 21, Issue 22, May 31, 2010. ***(Impact Factor: 3.844)***
10. Raghunandan Seelaboyina, **Indranil Lahiri**, Wonbong Choi, *Carbon Nanotube Embedded Novel 3-Dimensional Alumina Microchannel Cold Cathodes for High Electron Emission*, **Nanotechnology**, 21 (14), 2010, 145206. ***(Impact Factor: 3.979)***

9. Wonbong Choi, **Indranil Lahiri**, Raghunandan Seelaboyina, Yong Soo Kang, *Synthesis of graphene and its applications: a review*, **Critical Reviews in Solid State and Materials Sciences**, 35, 2010, 52-71. ***(Impact Factor: 9.467)*** ***Most-cited article of the journal till 2014***
**http://www.tandfonline.com/eprint/kBHWaJ6rC4XT855NsaVn/full**

## 2009

8. **Indranil Lahiri**, Sanjeev Bhargava, *Crystallite size of mechanically alloyed Cu-Cr powder – a comparison between X-ray diffraction and atomic force microscopy techniques,* **Materials Characterization,** 60 (11), 2009, 1406-1410. ***(Impact Factor: 1.572)***
7. **Indranil Lahiri**, Sanjeev Bhargava, *Enhanced properties of functionally gradient Cu-Cr powder compacts*, **International Journal of Materials Research (formerly: Zeitschrift fuer Metallkunde)**, 100 (5), 2009, 723-729. ***(Impact Factor: 0.830)***
6. **Indranil Lahiri**, S. Bhargava, *Compaction and sintering response of mechanically alloyed Cu-Cr powder*, **Powder Technology**, 189 (3), 2009, 433-438. ***(Impact Factor: 2.080)***
5. **I. Lahiri**, S. Bhargava, *X-ray powder diffraction line profile analysis of mechanically alloyed Cu-Cr powder,* **Materials Science and Technology,** 25 (4), 2009, 520-526. ***(Impact Factor: 0.772)***

## 2000 – 2008

4. **Indranil Lahiri**, K. Balasubramanian, *Application of mechano-chemical synthesis for protective coating on steel grinding media prior to ball milling of copper*, **Bulletin of Materials Science**, 30 (2), 2007, 157-161. ***(Impact Factor: 0.880)***
3. Satyam Suwas, **I. Lahiri,** R.K. Ray, S. Bhargava, *The knoop hardness yield locus of Ti-24Al-11Nb alloy*, **Materials Letters**, 57 (21), 2003, 3251-3256. ***(Impact Factor: 2.307)***
2. **Indranil Lahiri,** Debrupa Lahiri (Mondal), S. Bhargava, *Effect of prior $\beta$-processing on superplasticity of ($\alpha$+$\beta$) thermo mechanically treated Ti-6Al-4V alloy*, **Materials and Manufacturing Processes**, 18 (4), 2003, 621-635. ***(Impact Factor: 1.058)***
1. **Indranil Lahiri**, S. Bhargava, *Superplasticity in titanium alloys*, **Titanium**, 5 (2), 2000, 11-21.

## Peer-reviewed Symposium Proceedings (Published/Accepted)

6. Wonbong Choi, **Indranil Lahiri**, *Novel design considerations for high efficiency carbon nanotube field emitters, Technical Digest - 25th International Vacuum Nanoelectronics Conference, IVNC 2012 , art. no. 6316855 , pp. 30-31.*
5. Chiwon Kang, **Indranil Lahiri**, Rangasamy Baskaran, Mansoo Choi, Yang-Kook Sun, Wonbong Choi, *3D Multiwall Carbon Nanotubes (MWCNTs) for Li-Ion Battery Anode*, **TMS 2012 Proc.**, Vol. 2, 2012, 35-41.

4. Santanu Das, **Indranil Lahiri**, Chiwon Kang, Wonbong Choi, *Engineering Carbon Nanomaterials for Future Applications: Energy and Bio-sensor*, **Proc. SPIE 8031**, 80311K (2011), DOI: 10.1117/12.883743.
3. **Indranil Lahiri**, Sung-Woo Oh, Yang-Kook Sun, Wonbong Choi, *High specific capacity and excellent stability of interface-controlled MWCNT based anodes in lithium ion battery*, **MRS Symp. Proc. 2010**, Vol. 1313, mrsf10-1313-kk07-11, 60-67.
2. Ved P. Verma, Santanu Das, **Indranil Lahiri**, Wonbong Choi, *Large area graphene on polymer films for transparent and flexible field emission device*, **MRS Symp. Proc. 2010**, Vol. 1283, 2011, 82-88.
1. **Indranil Lahiri**, Raghunandan Seelaboyina, Won Bong Choi, *Field Emission Response from Multiwall Carbon Nanotubes Grown on Different Metallic Substrates*, In *Nanotubes and Related Nanostructures — 2009*, Ed. Yoke Khin Yap (**MRS Symp. Proc.** Vol. 1204, Warrendale, PA, 2010), 1204-K18-21, 257-263.

## Invited/Contributed/Poster Presentations

49. Vaibhav Jain, Amit Tripathi, Indranil Lahiri, *Field Emission response of CNT Emitters synthesized on different substrate*, 7th **Bangalore India Nano**, Bangalore, India, Dec. 4-6, 2013. (to be presented)
48. Krishna Saini, Khelendra Agrawal, Debrupa Lahiri, Indranil Lahiri, *Bonding Strength of CuO NT with substrate*, 7th **Bangalore India Nano**, Bangalore, India, Dec. 4-6, 2013. (to be presented)
47. Amit Tripathi, Vaibhav Jain, Indranil Lahiri, *Growth of vertically aligned CNTs on Cu substrate*, 7th **Bangalore India Nano**, Bangalore, India, Dec. 4-6, 2013. (to be presented)
46. Gaurav Mital, Indranil Lahiri, *CNT based 3-dimensional structure as high current density field emitter*, **Indian Institute of Metals (IIM) Annual Technical Meeting**, Pune, India, Nov. 12-15, 2014.
45. Sameer Chouksey, Indranil Lahiri, *Si-CNT hybrid structure as Li-ion battery anode material*, **Indian Institute of Metals (IIM) Annual Technical Meeting**, Pune, India, Nov. 12-15, 2014.
44. Indranil Lahiri, *Prospect of Carbon Nanotubes in Li-ion Battery*, **TMS 2014**, San Diego, USA, Feb. 16-20, 2014.
43. Gaurav Mittal, Indranil Lahiri, *High-current-density field emitter with carbon nanotubes – an overview*, 6th **Bangalore India Nano**, Bangalore, India, Dec. 4-6, 2013.
42. Sameer Chouksey, Indranil Lahiri, *High performance Li-ion battery based on CNT-Si Core-Shell structured anode – an overview*, 6th **Bangalore India Nano**, Bangalore, India, Dec. 4-6, 2013.
41. Indranil Lahiri, *Carbon nanotube as an anode material in Li-ion battery*, **Indian Institute of Metals (IIM) Annual Technical Meeting**, Varanasi, India, Nov. 12-16, 2013. (Invited)
40. Indranil Lahiri, C*arbon nanotube based high energy-efficient applications*, Short term course on "**Essentials of Nanoscience and Nanotechnology**", 18-22 February, 2013, IIT Roorkee. (Invited)
39. Chiwon Kang, Indranil Lahiri, Rangasamy Baskaran, Won-Gi Kim, Yang-Kook Sun, Wonbong Choi, *3 Dimensional Carbon Nanofibers for Li-Ion Battery Anode*, **MRS Fall 2012**, Boston, USA, Nov. 25-30, 2012.

38. Indranil Lahiri, Wonbong Choi, *Novel design considerations for high efficiency carbon nanotube field emitters: Interface engineering and 3-D architecture*, **MS&T 2012**, Pittsburgh, USA, 7 – 11 October, 2012.
37. Indranil Lahiri, Wonbong Choi, *High efficiency field emission and energy storage: Application of interface engineered carbon nanotube structure**s***, **Nano Korea 2012**, Seoul, Korea, August 16-18, 2012.
36. Indranil Lahiri, Ved Prakash Verma, Wonbong Choi, *Transparent, Flexible Field Emitter using hybrid Graphene-MWCNT structure*, **Nano Korea 2012**, Seoul, Korea, August 16-18, 2012.
35. Rangasamy Baskaran, Chiwon Kang, Indranil Lahiri, Wonbong Choi, *Ex-situ investigations on 3D MWCNT anode for Li ion battery*, **Nano Korea 2012**, Seoul, Korea, August 16-18, 2012.
34. Wonbong Choi, Indranil Lahiri, *Novel design considerations for high efficiency carbon nanotube field emitters*, **25$^{th}$ International Vacuum Nanoelectronics Conference 2012** (IVNC 2012), Jeju, Korea, July 9-13.
33. Indranil Lahiri, Wonbong Choi, *Interface engineered carbon nanotube based high efficiency electrodes for field electron emission and energy storage devices*, **11$^{th}$ US-Korea Workshop on Nanostructured Materials**, Dallas, USA, May 1 – 4, 2012.
32. Indranil Lahiri, Ved Prakash Verma, Wonbong Choi, *Graphene-CNT hybrid structure based Transparent and Flexible Field Emission Device*, **9$^{th}$ US-Korea Workshop on Nanoelectronics**, Dallas, USA, May 1 – 4, 2012.
31. Indranil Lahiri, Wonbong Choi, *Interface engineering as a tool to enhance efficiencies of carbon nanotube based devices*, **TMS 2012**, Orlando, USA, Mar. 11-15, 2012.
30. Wonbong Choi, Indranil Lahiri, Santanu Das, Chiwon Kang, *Application of Carbon Nanotubes – Energy to Bioelectronic Sensor*, **TMS 2012**, Orlando, USA, Mar. 11-15, 2012.
29. Chiwon Kang, Indranil Lahiri, Rangasamy Baskaran, Mansoo Choi, Yang-Kook Sun, Wonbong Choi, *3D Multiwall Carbon Nanotubes (MWCNTs) for Li-Ion Battery Anode*, **TMS 2012**, Orlando, USA, Mar. 11-15, 2012.
28. Indranil Lahiri, Wonbong Choi, *Interface engineered carbon nanotube based high efficiency electrodes for field electron emission and energy storage devices*, **MRS Fall 2011**, Boston, USA, Nov. 28 – Dec. 2, 2011.
27. Indranil Lahiri, Santanu Das, Chiwon Kang, Wonbong Choi, *Field electron energized phase change in thin $Ge_2Sb_2Te_5$ film for memory application*, **2011 ASME-IMECE**, Denver, USA, Nov. 11 – 17, 2011.
26. Indranil Lahiri, Wonbong Choi, *Ultrathin alumina coated carbon nanotubes as anodes for high capacity Li-ion battery*, **MS&T 2011**, Columbus, USA, 16 – 20 October, 2011.
25. Indranil Lahiri, Wonbong Choi, *Interface engineered carbon nanotube-based field emission devices*, **MS&T 2011**, Columbus, USA, 16 – 20 October, 2011.

24. Chiwon Kang, Indranil Lahiri, Rangasamy Baskaran, Mansoo Choi, Yang-Kook Sun, Wonbong Choi, *An efficient Li-Ion Battery Anode Based on 3D Carbon Nanotubes Structure*, **Nano Florida 2011**, Miami, USA, Sep. 30 – Oct. 1, 2011.
23. Indranil Lahiri, Wonbong Choi, *Performance optimization of carbon nanotube-based field emission devices through interface engineering*, **Nano-Electronic Devices for Defense and Security Conference (Nano-DDS)**, Brooklyn, USA, Aug. 29 – Sept. 1, 2011.
22. Indranil Lahiri, Ved Prakash Verma, Santanu Das, Wonbong Choi, *CNT-on-graphene composite structure as transparent-flexible field emission device*, **Nano-Electronic Devices for Defense and Security Conference (Nano-DDS)**, Brooklyn, USA, Aug. 29 – Sept. 1, 2011.
21. W. Choi, I. Lahiri, S. Das, M. Choi, P. Sudhagar, Y. Sun, Y. Kang, *Carbon Nanomaterials for High Efficiency Energy Devices,* **The 18$^{th}$ International Conference on Composite Materials**, Jeju Island, Korea, 21-26 August, 2011.
20. Indranil Lahiri, Ved Prakash Verma, Mansoo Choi, Wonbong Choi, *A Graphene-based Hybrid Structure as Flexible, Transparent Field Emitter*, **Graphene 2011**, Bilboo, Spain, 11 – 14 April, 2011.
19. Indranil Lahiri, Ved Prakash Verma, Wonbong Choi, *Graphene-CNT hybrid structure based Transparent and Flexible Field Emission Device*, **TMS Annual Meeting 2011**, San Diego, USA, Feb. 27 – Mar 3, 2011.
18. Indranil Lahiri, Debrupa Lahiri, Sungho Jin, Arvind Agarwal, Wonbong Choi, *Carbon Nanotubes: How strong is their bond with the substrate?*, **TMS Annual Meeting 2011**, San Diego, USA, Feb. 27 – Mar 3, 2011.
17. Indranil Lahiri, Sung-Woo Oh, Yang-Kook Sun, Wonbong Choi, *MWCNT based structures as negative electrodes for high capacity lithium ion batteries*, **TMS Annual Meeting 2011**, San Diego, USA, Feb. 27 – Mar 3, 2011.
16. Santanu Das, Indranil Lahiri, Ved Verma, Wonbong Choi, *Graphene for Large Scale Flexible Transparent Conducting Nanoelectronics and Bio-Devices*, **BIONIUM 2010**, Miami, USA, 9 – 10 December, 2010.
15. Indranil Lahiri, Sung-Woo Oh, Yang-Kook Sun, Wonbong Choi, *High specific capacity and excellent stability of interface-controlled MWCNT based anodes in lithium ion battery*, **MRS Fall 2010**, Boston, USA, Nov. 29 – Dec. 3, 2010.
14. Ajay Kumar, Indranil Lahiri, Wonbong Choi, *The field emission from multiwall carbon nanotubes grown on copper foam*, **MRS Fall 2010**, Boston, USA, Nov. 29 – Dec. 3, 2010.
13. Ved P. Verma, Santanu Das, Indranil Lahiri, Wonbong Choi, *Large area graphene on polymer films for transparent and flexible field emission device*, **MRS Fall 2010**, Boston, USA, Nov. 29 – Dec. 3, 2010.
12. Ved P. Verma, Indranil Lahiri, Santanu Das, Mansoo Choi, Wonbong Choi, *Graphene for flexible field emission display*, **Dasan Conference: Graphene Science and Technology**, Boston, USA, Nov. 29 – Dec. 3, 2010.

11. Indranil Lahiri, Sung-Woo Oh, Yang-Kook Sun, Wonbong Choi, *High specific capacity and excellent stability of interface-controlled MWCNT based anode structures for application in lithium ion batteries*, **218th ECS Meeting**, Las Vegas, USA, 10-15 October, 2010.
10. Indranil Lahiri, Sung-Woo Oh, Yang-Kook Sun, Wonbong Choi, *Multi wall carbon nanotubes directly grown on copper current collector as anode for lithium ion batteries*, **2010 Florida Energy Systems Consortium Summit**, Orlando, USA, 28-29 September 2010.
9. Ved Verma, Santanu Das, Indranil Lahiri, Wonbong Choi, *Large-area Graphene on Polymer Film for Transparent and Flexible Electrode*, **2010 Florida Energy Systems Consortium Summit**, Orlando, USA, 28-29 September 2010.
8. Indranil Lahiri, Raghunandan Seelaboyina, Wonbong Choi, *Enhanced field emission from multiwall carbon nanotubes through substrate optimization and novel 3D design*, **IEEE NANO 2010-NANO KOREA 2010**, Seoul, Korea, 17-20 August, 2010.
7. Santanu Das, Raghunandan Seelaboyina, Ved Verma, Indranil Lahiri, Dong Hoon Song, Young Soo Kang, Wonbong Choi, *Graphene and carbon nanotube hybrid structure and its applications in flexible electronics devices*, **IEEE NANO 2010-NANO KOREA 2010**, Seoul, Korea, 17-20 August, 2010.
6. Chiwon Kang, Indranil Lahiri, Yang-Kook Sun, Wonbong Choi, *Synthesis and electrochemical characterization of carbon nanostructures for Li-ion battery anode*, **US-Korea Conference 2010**, Seattle, USA, 11-15 August, 2010.
5. Indranil Lahiri, Chiwon Kang, Wonbong Choi, *Carbon nanostructures in Li-ion batteries*, **FIU First Energy Day Workshop**, Miami, USA, 12 March, 2010.
4. Jun Huang, Bei Wang, Indranil Lahiri, Awnish K. Gupta, Peter C. Eklund, Wonbong Choi, *Controlled Growth of Single-walled Carbon Nanotubes for Unique Nanodevices*, **Nano-Korea 2009,** Seoul, Korea, 26-28 August, 2009.
3. Indranil Lahiri, Raghunandan Seelaboyina, Wonbong Choi, *Field Emission Response from Multiwall Carbon Nanotubes Grown on Different Metallic Substrates*, **MRS Fall 2009,** Boston, USA, 30 November – 4 December, 2009.
2. Indranil Lahiri, Raghunandan Seelaboyina, Wonbong Choi, *High efficiency multi-walled carbon nanotube field emitters grown on pure Cu substrate*, **TMS Annual Meeting**, San Francisco, USA, 15-19 February, 2009.
1. R. Seelaboyina, I. Lahiri, K.W. Jones, W.B. Choi, *A novel ceramic high secondary yield micro-channel plate*, **TMS Annual Meeting**, San Francisco, USA, 15-19 February, 2009.

## Students Supervised

### Ph.D (Completed – 0; On-going – 4)

| Sl. No. | Name | Dept./Center | Admitted in | Supervisor/Co-Supervisor | Area of Research |
|---|---|---|---|---|---|
| 1 | Raj Kumar | Metallurgical & Materials | Autumn 2013 | Supervisor | Nano-materials for solar cell application |

| | | | | | |
|---|---|---|---|---|---|
| | | Engineering | | | |
| 2 | Vijayesh Kumar | Center of Nanotechnology | Autumn 2013 | Co- Supervisor (Dr. D. Lahiri as Supervisor) | Synthesis and application of boron nitride nanostructures |
| 3 | Pramod Kumar | Metallurgical & Materials Engineering | Autumn 2012 (joined group in Autumn 2013) | Supervisor (Dr. A. Mitra, Physics as Co-Supervisor) | Optical properties of carbon nanomaterials |
| 4 | Gurjinder Kaur | Metallurgical & Materials Engineering | Autumn 2014 | Supervisor | Graphene synthesis |

## Masters (Completed – 2; On-going – 3)

| Sl. No. | Name | Dept./Center | Admitted in | Supervisor/Co-Supervisor | Area of Research | Comments |
|---|---|---|---|---|---|---|
| 1 | Gaurav Mittal | Center of Nanotechnology | Autumn 2012 | Supervisor | Field emission | Graduated in June2014 |
| 2 | Sameer Chouksey | Center of Nanotechnology | Autumn 2012 | Co- Supervisor (Dr. D. Lahiri as Supervisor) | Li-ion battery | Graduated in June2014 |
| 3 | Krishna Saini | Center of Nanotechnology | Autumn 2013 | Supervisor | Synthesis of nanostructures | |
| 4 | Amit Tripathy | Metallurgical & Materials Engineering | Autumn 2013 | Supervisor | Synthesis of C-nanostructures | |
| 5 | Vaibhav Jain | Metallurgical & Materials Engineering | Autumn 2013 | Supervisor | Field emission | |

## Undergraduate

| Sl. No. | Name | Status | Active Year of Research | Area of Research |
|---|---|---|---|---|
| 1 | Shikhar Gupta<br>Siddharth Gupta<br>Vipul Tiwari | 4th year, MMED (B.Tech. Major Project) | 2013-14 | Synthesis of Reduced Graphene Oxide |
| 2 | Swapnil Parkhe<br>Rahul Agarwal<br>Pratibh Vijay Sirowa | 4th year, MMED (B.Tech. Major Project) | 2013-14 | Developing carbon nanotube based composite materials for lithium ion battery electrodes (Co-PI: D. Lahiri) |
| 3 | Himanshu Garg<br>Gopesh Kumar<br>Mahendra Kumar Meena | 4th year, MMED (B.Tech. Major Project) | 2013-14 | Nanofillers reinforced (Cu based structural) composites for electrical application (Co-PI: D. Lahiri) |
| 4 | Shubham Gupta | 3rd year, MMED | Autumn 2013 | Synthesis of graphene |
| 5 | Hemant Charaya<br>M. Karthick<br>Akshay V. Singhal | 3rd and 2nd year, MMED | Autumn 2013 | Synthesis and application of RGO |
| 6 | M. Karthick | 2nd year, MMED | Summer 2013 | Electrochemical exfoliation for |

| | | | | |
|---|---|---|---|---|
| | Apratim Khandelwal | | (Summer Undergraduate Research Assistantship) | synthesis of graphene |
| 7 | Chayan Sengar | 2nd year, MMED | Summer 2014 | Cu-Cr based contact materials |
| 8 | Arvind Dasgupta | 4th year, MMED (B.Tech. Major Project) | 2014-15 | |
| 9 | Akshay V. Singhal | 4th year, MMED (B.Tech. Major Project) | 2014-15 | |

## Research Funding

| Sl. No. | Project Title | Funding Agency | Financial Outlay (Rs) | Initiated in | Duration | P. I. and other investigators |
|---|---|---|---|---|---|---|
| 1 | Design and Development of Carbon Nanotube Based Ultra-High Current-Density Field Emission System | IIT Roorkee | 10,00,000 | May 2013 | 3 years | Dr. Indranil Lahiri |

## Affiliation to Professional Societies

- The Minerals, Metals & Materials Society (TMS)
- ASM International
- Materials Research Society of India (MRS-I) – Life Member
- Indian Institute of Metals (IIM) – Life Member

# Other Leadership Activities

- **Faculty Advisor**, Material Advantage, IIT Roorkee chapter, since its inception in 2014.
- ***Served*** as "Student Board Member" in **Board of Trustees – ASM International**, 2010-11, USA. (http://www.asminternational.org/content/docs/Lahiri.pdf)
- ***Chair*** (2009-10), Material Advantage chapter, FIU, USA.
- ***Secretary*** (2008-09), Material Advantage chapter, FIU, USA.
- ***Led*** Material Advantage chapter at FIU to win several international accolades including ASM Materials Education Foundation Grant, Fall Membership Challenge - Most Innovative Recruitment Strategy Award), World Materials Day Award and Chapter of Excellence Awards (2 times).

- ***In-charge*** of SEM, thermal CVD system, field emission characterization system, battery testing unit, FIU, USA.
- ***In-charge*** of "Materials Testing Lab.", "Nanomaterials by mechanical alloying" group, ***Principal coordinator*** for "Alloy melting, processing and testing" group, ***coordinator*** for many sponsored projects from ISRO, BEL, BHEL, Indian Navy etc., NFTDC, Hyderabad, India.

## Other Professional Activities

- **Key Reader (Member of Board of Review)** for Metallurgical and Materials Transactions E.
- **Reviewer** for
  1. Metallurgical and Materials Transactions A (Received '*Letter of Appreciation*' ***thrice*** from the Editor for '*Excellent*' reviews) (Publisher: ASM International and TMS)
  2. Surface and Coatings Technology (Publisher: Elsevier)
  3. Materials Science and Engineering A (Publisher: Elsevier)
  4. New Journal of Chemistry (Publisher: Royal Society of Chemistry, London)
  5. RSC Advances (Publisher: Royal Society of Chemistry, London)
  6. Journal of Physics and Chemistry of Solids (Publisher: Elsevier)
  7. Current Applied Physics (Publisher: Elsevier)
  8. Chemical Communications (Publisher: Royal Society of Chemistry, London)
  9. Journal of Materials Engineering and Performance (Publisher: ASM International)
  10. Materials Characterization (Publisher: Elsevier)
  11. Journal of Materials Processing Technology (Publisher: Elsevier)
  12. Powder Technology (Publisher: Elsevier)
  13. Nanomaterials and Energy (Publisher: ICE Publishing)
  14. Materials Letters (Publisher: Elsevier)
  15. ACS Applied Materials and Interfaces (Publisher: American Chemical Society)
  16. Journal of Alloys and Compounds (Publisher: Elsevier)
  17. MRS Symposium Proceedings (Publisher: Materials Research Society)
  18. Bulletin of Materials Science (Publisher: Indian Academy of Sciences, Materials Research Society of India and Indian National Science Academy)
- **External Grant Proposal Reviewer** for Georgia National Science Foundation.
- **External Grant Proposal Reviewer** for National Research Council, Romania.
- **Book Proposal Reviewer** for Elsevier Publishing
- **Book Proposal Reviewer** for CRC Press (Taylor & Francis Group LLC)
- **Visiting researcher** in WCU Department of Energy Engineering, Hanyang University, Seoul, Korea, May-June 2009.
- **Offered** "Nanotechnology Classes" (including seminar and interesting hands-on demonstration) on recent advances in nanotechnology and its impact on community, to high school students of "Coral

Park Senior High School" several times during 2009-10. **Received 'letter of appreciation'** from Office of Intergovernmental Affairs and Community Engagement, Miami-Dade County, Florida, USA – for this community service.

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