

## Sunghwan Jin

Institute of Basic Science (IBS) /Ulsan, Korea  
Center for Multidimensional Carbon Materials (CMCM)

Research Fellow

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### Education

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**-Korea Advanced Institute of Science and Technology (KAIST)/** Daejeon, Korea

03/2013 *Ph. D.* in Material Science and Engineering

Field of Specialization: Conductive Materials based on Carbon Nanotube and Graphene Nanocomposites

Dissertation: Fabrication Processes of Carbon Nanomaterial Composites and Their Applications for Conductive Materials in Organic Solar Cells

Research Advisors: Prof. Soon Hyung Hong and Prof. Seokwoo Jeon

**-Konkuk University/** Seoul, Korea

02/2007 *B.S.* in Material Chemistry and Engineering

### Professional Work Experiences

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03/2015-present **Institute of Basic Science (IBS) /**Ulsan, Korea  
Center for Multidimensional Carbon Materials (CMCM)  
Research Fellow  
Supervisor: Prof. Rodney S. Ruoff.

01/2014-01/2015 **Northwestern University/** IL, USA  
Dept. of Materials Science and Engineering  
Postdoctoral researcher: Sorting of post-graphene two-dimensional nanomaterials by density gradient ultracentrifugation  
Supervisor: Prof. Mark C. Hersam

09/2013-12/2013 **Korea Advanced Institute of Science and Technology (KAIST)/**

Daejeon, Korea

Applied Science Research Institute

Postdoctoral researcher: carbon nanomaterials and their composites for multi-functional applications

Supervisor: Prof. Soon Hyung Hong

08/2009-10/2009

**University of Texas at Austin/** Texas, USA

Dept. of Mechanical Engineering and the Texas Materials Institute

Visiting researcher: Fabrication & characterization of graphene and graphene/polymer nanocomposites

Supervisor: Prof. Rodney S. Ruoff

03/2007-08/2013

**Korea Advanced Institute of Science and Technology (KAIST)/**

Daejeon, Korea

Dept. of Materials Science and Engineering

Graduate student: Carbon nanomaterials and their composites for multi-functional applications

Supervisor: Prof. Soon Hyung Hong and Prof. Seokwoo Jeon

## **Honors/Awards**

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- Postdoctoral fellowship from the National Research Foundation of Korea (2013, 11, 14)
- Best poster award in Spring Meeting of Korean Powder Metallurgy Institute (2008, 04, 11)

## **Research Experiences & Interests**

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-Carbon materials based composites

- Carbon nanomaterial/polymer composites for multi-functional applications  
(Carbon fiber/carbon nanotube/polymer composite for structural application, Organic solar cells, organic thin film transistors, transparent conductive films, stretchable conductors)
- Carbon nanomaterial/inorganic composites for multi-functional application (structural materials, organic solar cells)
- Functionalization (covalent functionalization, non-covalent functionalization) of carbon materials
- Fabrication of graphene nanosheets from graphene oxide and non-oxidized graphene

#### -Opto-electronics

- Fabrication and size control of graphene quantum dots
- Band gap control of graphene quantum dots by size and functionalization
- Graphene quantum dots and their composites for opto-electronic application (organic solar cells, organic light emitting diodes)
- Size sorting of carbon nanomaterials by salting out
- Bulkheterojunction typed organic solar cells from polymer: fullerene derivatives
- Normal and inverted structure of organic solar cells
- Carbon nanomaterial composites for electron transport layer, hole transport layers and photo-active layer in organic solar cells

#### -Texturing of metal films

- Fabrication and characterization of highly textured metal films (Cu, Ni, Co, etc)
- Chemical vapor deposition of graphene based on textured metal substrates

#### -Others

- Sorting of post-graphene two-dimensional nanomaterials by density gradient ultracentrifugation
- Materials characterization: atomic force microscopy, scanning electron microscopy, electron backscattered x-ray diffraction, Raman, electron backscatter diffraction, XPS, etc
- Fabrication of boron nitride nanosheets and their nanocomposites
- Nanoimprinting and nanostamping
- Deposition of metal oxide by sol-gel and atomic layer deposition
- Deposition of metal by E-beam, thermal evaporation and sputtering

## Academic and Research Achievement

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### Journal Publications

1. **Sung Hwan Jin**, Sung Hye Park, Gwang Hoon Jun, Seokwoo Jeon, Soon Hyung Hong (**The first two authors contributed equally to this work**). “Enhanced Electrical Properties in Carbon Nanotube/Poly (3-hexylthiophene) Nanocomposites Formed Through Non-covalent Functionalization”, *Nano Research*, 2011, 4, pp.1129–1135 (**IF: 8.893**).
2. Gwang Hoon Jun, **Sung Hwan Jin**, Sung Hye Park, Seokwoo Jeon, Soon Hyung Hong, “Highly dispersed carbon nanotubes in organic media for polymer:fullerene photovoltaic devices”, *Carbon*, 2012, 50, pp.40–46 (**IF: 6.198**).

3. **Sung Hwan Jin**, Gwang Hoon Jun, Soon Hyung Hong, Seokwoo Jeon, “Conformal coating of titanium suboxide on carbon nanotube networks by atomic layer deposition for inverted organic photovoltaic cells”, *Carbon*, 2012, 50, pp.4483-4488 (IF: 6.198).
4. **Sung Hwan Jin**, Da Hye Kim, Gwang Hoon Jun, Soon Hyung Hong, and Seokwoo Jeon, “Tuning the Photoluminescence of Graphene Quantum Dots through the Charge Transfer Effect of Functional Groups”, *ACS Nano*, 2013, 7, pp.1239–1245 (IF: 13.334).
5. Dongju Lee, Sung Ho Song, Jaewon Hwang, **Sung Hwan Jin**, Kwang Hyun Park, Bo Hyun Kim, Soon Hyung Hong, Seokwoo Jeon, "Enhanced Mechanical Properties of Epoxy Nanocomposites by Mixing Noncovalently Functionalized Boron Nitride Nanoflakes", *Small*, 2013, 9, pp.2602-2610 (IF: 8.315).
6. Gwang Hoon Jun, **Sung Hwan Jin**, Bin Lee, Bo Hyun Kim, Weon-Sik Chae, Soon Hyung Hong, Seokwoo Jeon, “Enhanced Conduction and Charge-Selectivity by N-Doped Graphene Flakes in the Active Layer of Bulk Heterojunction Organic Solar Cell”, *Energy & Environmental Science*, 2013, 6, pp.3000-3006 (IF: 25.427).
7. **Sung Hwan Jin**, Seung Il Cha, Gwang Hoon Jun, Jae Young Oh, Seokwoo Jeon, Soon Hyung Hong, “Non-covalently functionalized single walled carbon nanotube/poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate) nanocomposites for organic photovoltaic cell”, *Synthetic Metals*, 2013, 181, pp.92-97 (IF: 2.299).
8. Seongwoo Ryu, Bin Lee, Seonki Hong, **Sung Hwan Jin**, Sungjin Park, Soon Hyung Hong, Haeshin Lee, “Salting-out as a scalable, in-series purification method of graphene oxides from microsheets to quantum dots”, *Carbon*, 2013, 63, pp.45-53 (IF: 6.198).
9. Jaewon Hwang, Taeshik Yoon, **Sung Hwan Jin**, Jinsup Lee, Taek-Soo Kim, Soon Hyung Hong, Seokwoo Jeon, “Enhanced Mechanical Properties of Graphene/Copper Nanocomposites Using a Molecular-Level Mixing Process”, *Advanced Materials*, 2013, 25, pp.6724-6729 (IF: 18.960).
10. Sung Ho Song, Min-Ho Jang, Jin Chung, **Sung Hwan Jin**, Bo Hyun Kim, Seung-Hyun Hur, Seunghyup Yoo, Yong-Hoon Cho, Seokwoo Jeon, “Highly Efficient Light-Emitting Diode of Graphene Quantum Dots Fabricated from Graphite Intercalation Compounds”, *Advanced Optical Materials*, 2014, 2, pp.1016-1023 (featured as a cover article) (IF: 5.188).
11. Bin Lee, Min Young Koo, **Sung Hwan Jin**, Kyung Tae Kim, Soon Hyung Hong, “Simultaneous strengthening and toughening of reduced graphene oxide/alumina composites fabricated by molecular-level mixing process”, *Carbon*, 2014, 78, pp.212-219 (IF: 6.198).
12. Jae-Hyeok Lee, Young Kyu Jeong, John A. Peters, Gwang-Hyeon Nam, **Sunghwan Jin**, Jae-Ho Kim, “In-situ Fabrication of Nano Transistors by Selective Deposition of a Gate Dielectric around Carbon Nanotubes”, *ACS Applied Materials & Interfaces*, 2015, 7, pp. 24094–24102 (IF: 7.145).

13. Jae Young Oh, Gwang Hoon Jun, Sung Hwan Jin, Ho Jin Ryu, Soon Hyung Hong, “Enhanced Electrical Networks of Stretchable Conductors with Small Fraction of CNT/Graphene Hybrid Fillers”, *ACS Applied Materials & Interfaces*, 2016, 8, pp. 3319–3325 (**IF: 7.145**).
14. Jaemin Cha, Sunghwan Jin, Jae Hun Shim, Chong Soo Park, Ho Jin Ryu, Soon Hyung Hong, “Functionalization of carbon nanotubes for fabrication of CNT/epoxy Nanocomposites”, *Materials & Design*, 2016, 95, pp. 1-8 (**IF: 3.997**).
15. Sunghwan Jin, Gwang Hoon Jun, Seokwoo Jeon, Soon Hyung Hong, “Design and application of carbon nanomaterials for photoactive and charge transport layers in organic solar cells”, *Nano Convergence*, 2016, 3:8.
16. H. Yoon, Y. H. Chang, S. H. Song, E. S. Lee, S. H. Jin, C. Park, J. Lee, B. H. Kim, H. J. Kang, Y. H. Kim, S. Jeon, “Intrinsic Photoluminescence Emission from Subdomained Graphene Quantum Dots”, *Advanced Materials*, 2016, 28, 5255-5261.

## Patents

1. Soon Hyung Hong, Sung Hwan Jin, Chan Bin Mo, Jang Kyo Kim, Pengcheng Ma, Benzhong Tang. “Method of fabrication silver nanoparticle decorated carbon nanotube nanocomposites”.  
-Korea patent number: KR 10-0961914 (2010.05.31).  
-China patent number: ZL 200910142389.2 (2012.05.30).
2. Soon Hyung Hong, Jae Won Hwang, Byung Kyu Lim, Sung Hwan Jin, “Graphene/metal nanocomposite powder and method of manufacturing thereof”.  
-Korea patent number: KR 10-1337994 (2013.12. 02).  
-China patent number: ZL 201110129833.4 (2014.11.26)  
-US patent application number: 13-086749 (2011.04.14).  
-Japan patent number: 5539923 (2014.05.09).
3. Soon Hyung Hong, Seokwoo Jeon, Sung Hwan Jin, Sung Hye Park, Gwang Hoon Jun, “Non-covalent functionalized carbon nanotube and preparing method of the same, composite using the same, and thin film transistor using the composite”.  
-Korea patent application number: 10-2011-0110757 (2011.10.27).
4. Soon Hyung Hong, Seokwoo Jeon, Sung Hwan Jin, Sung Hye Park, Gwang Hoon Jun, “Carbon nanotube/metal oxide composite, preparing method of the same, and organic solar cell containing the same”.  
-Korea patent number: KR 10-1340355 (2013.12. 04).
5. Soon Hyung Hong, Seokwoo Jeon, Sung Hwan Jin, Sung Hye Park, Gwang Hoon Jun, “Carbon nanotube/metal oxide composite, preparing method of the same

-Korea patent number: KR 10-1511205 (2015.04. 06).

6. Soon Hyung Hong, Seokwoo Jeon, Oh Jae Young, Sung Hwan Jin, Sung Hye Park, Gwang Hoon Jun,

“A stretchable conductor containing carbon nanotube-graphene hybrid and manufacturing of the same”.

-Korea patent application number: 10-2013-0113670 (2013.09.25).

7. Soon Hyung Hong, Sung Hwan Jin, Cha Jae Min, Jae Won Hwang, Dongju Lee,  
“Carbon nanomaterial, carbon nanomaterial-polymer composite material, carbon fiber-carbon nanomaterial-polymer composite, and methods preparing the same”

-Korea patent application number: 10-2014-0011454 (2014.01.29).

-US patent application number: 14-607450 (2015.02.03).

8. Rodney S Ruoff, Sung Hwan Jin, “Single crystal metal foil, and method of manufacturing the same”

-Korea patent application number: 10-2016-0087904 (2016.07.12).