

Curriculum Vitae

■ Personal Information

Name Sung-Soo Kim
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■ Professional Experience

Oct 2018 – Current **Senior Researcher, Korea Institute of Science and Technology
Jeonbuk Institute of Advanced Composite Materials, Wanju-gun,
Jeollabuk-do, Republic of Korea.**
Carbon Composite Materials Research Center

■ Academic Experience

Sep 2016 – Sep 2018 **Postdoctoral Associate, University of Minnesota, Minneapolis, MN,
United States of America.**
Department of Chemical Engineering and Materials Science
Advisor: Prof. Dr. Christopher J. Ellison

Sep 2015 – Aug 2016 **Postdoctoral Associate, Seoul National University, Seoul, Republic
of Korea.**
Department of Chemistry
Advisor: Prof. Dr. Byeong-Hyeok Sohn

■ Educational Background

- Mar 2009 – Aug 2015 **Ph.D. in Chemistry, Seoul National University.**
Department of Chemistry (division of polymer chemistry)
Dissertation Title: Arrays of ordered nanostructures synthesized from diblock copolymers and their micelles for large-area graphene nanopatterning
Advisor: Prof. Dr. Byeong-Hyeok Sohn
- Mar 2005 – Feb 2009 **B.S. in Chemistry, Seoul National University.**
Department of Chemistry
(double major) **B.S. in Physics, Seoul National University.**
Department of Physics and Astronomy
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■ Theses

- [1] Kim, S.-S. Arrays of ordered nanostructures synthesized from diblock copolymers and their micelles for large-area graphene nanopatterning. Ph.D. Dissertation, Seoul National University, Seoul, 2015.
- [2] Kim, S.-S. Concentration of Ca^{2+} measured by Cameleon based on fluorescence resonance energy transfer (FRET) spectroscopy. B.S. Thesis (Chemistry), Seoul National University, Seoul, 2009.
- [3] Kim, S.-S. Application of polymer nanocomposite to photovoltaic cells. B.S. Thesis (Physics), Seoul National University, Seoul, 2009.
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■ Honors and Awards

- 2014 Best presenter award, The Polymer Society of Korea.
- 2013 Best poster award, Germany-Korean Polymer Symposium (GKPS).
- 2011 Best poster award, Institute of Electrical and Electronics Engineers (IEEE) Nanotechnology Materials and Device Conference (NMDC).
- 2011 Kwanjeong educational foundation scholarship
- 2009 Graduation with honor (*Summa Cum Laude*), Seoul National University.
- 2006, 2009 Prize for exceptional performance, College of Natural Sciences, Seoul National University.
- 2005–2010 National science & technology scholarship, the Ministry of Education, Science, and Technology, Republic of Korea.
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■ List of Peer-Reviewed Publications (latest publication first)

(† indicates the equal contribution as co-first authors.; * for corresponding authors.)

- [38] Jang, M.; Choi, D.; Kim, Y.; Kil, H.-S.; Kim, S.-K.; Jo, S. M.; Lee, S.; Kim, S.-S.* Role of sulfuric acid in thermostabilization and carbonization of lyocell fibers. *Cellulose*, in press.
- [37] Thi, Q. V.; Han, J.; Park, J.; Kim, S.-S.*; Jeon, D. Y.*; Joo, Y.* Printable and recyclable carbon nanotube electronics with degradable soybean oil-based polycationic substrate as gate dielectrics. *Carbon*. **2023**, *212*, 118089..
- [36] Lee, G.; Park, S. I.; Shin, H. Y.; Joh, H.-I.; Kim, S.-S.*; Lee, S.* Simultaneous reactions of sulfonation and condensation for high-yield conversion of polystyrene into carbonaceous material. *J. Ind. Eng. Chem.* **2023**, *122*, 426-436.
- [35] Shin, H. Y.; Jo, S. M.; Kim, S.-S.* Oxidative depolymerization of lignin assisted by potassium *tert*-butoxide and its effect on color and UV absorption. *Ind. Crops Prod.* **2022**, *187*, 115539.
- [34] Choi, J.; Lee, Y.; Chae, Y.; Kim, S.-S.; Kim, T.-H.*; Lee, S.* Unveiling the transformation of liquid crystalline domains into carbon crystallites during carbonization of mesophase pitch-derived fibers. *Carbon* **2022**, *199*, 288-299.
- [33] Jang, M.†; Shin, H. Y.†; Jang, D.; Jo, S. M.; Kim, S.; Kim, S.-S.* All-lignin-based thermoset foams via azide-alkyne cycloaddition and their fire resistance after oxidation *ACS Appl. Polym. Mater.* **2022**, *4* (4), 2712-2723.
- [32] Kim, J. Y.; Choi, Y.; Choi, J.; Kim, Y.-J.; Kang, J.; Kim, J. P.; Kim, J. H.; Kwon, O.; Kim, S.-S.; Kim, D. W.* Graphene nanoribbon/carbon nanotube hybrid hydrogel: rheology and membrane for ultrafast molecular diafiltration. *ACS Appl. Mater. Interfaces* **2022**, *14* (9), 11779-11788.
- [31] Choi, J.; Yang, I.; Kim, S.-S.*; Cho, S. Y.*; Lee, S.* Upcycling plastic waste into high value-added carbonaceous materials. *Macromo. Rapid Commun.* **2022**, *43* (1), 2100467.
- [30] Lee, G.; Lee, M. E.; Kim, S.-S.; Joh, H.-I.; Lee, S.* Efficient upcycling of polypropylene-based waste disposable masks into hard carbons for anodes in sodium ion batteries. *J. Ind. Eng. Chem.* **2022**, *105*, 268-277.
- [29] Lau, C. M. †; Kim, S.-S. †; Lillie, L.; Tolman, W. B.*; Reineke, T. M.*; Ellison, C. J.* Structural Basis for the Different Mechanical Behaviors of Two Chemically Analogous, Carbohydrate-derived Thermosets. *ACS Macro Lett.* **2021**, *10* (5), 609-615.
- [28] Choi, S. E.; Kim, S.-S.; Choi, E.; Kim, J. H.; Choi, Y.; Kang, J.; Kwon, O.; Kim, D. W.* Structural basis for the different mechanical behaviors of two chemically analogous, carbohydrate-derived thermosets. *Sci. Rep.* **2021**, *11*, 9518.
- [27] Kang, D. †; Lee, Y. †; Park, K. H.; Bae, J.-S.; Jo, S. M.; Kim, S.-S.*; Carbon fibers derived from oleic acid-functionalized lignin via thermostabilization accelerated by UV irradiation. *ACS Sustainable Chem. Eng.* **2021**, *9* (14), 5204-5216.
- [26] Lee, Y.; Lee, D. H.; Kim, B.-J.; Chung, Y.-S.; Kim, S.-S.*; Lee, S.* Enhancing physical properties of mesophase pitch-based graphite fibers by modulating initial stabilization temperature. *J. Ind. Eng. Chem.* **2021**, *94*, 397-407.
- [25] Choi, Y.; Kim, S.-S.; Kim, J. H.; Kang, J.; Choi, E.; Choi, S. E.; Kim, J. P.; Kwon, O.; Kim, D. W.* Graphene oxide nanoribbon hydrogel: viscoelastic behavior and use as a molecular separation membrane. *ACS Nano* **2020**, *14* (9), 12195-12202..
- [24] Koh, J. H.; Zhu, Q.; Asano, Y.; Maher, M. J.; Ha, H.; Kim, S.-S.; Cater, H. L.; Mapesa, E. U.; Sangoro, J. R.; Ellison, C. J.; Lynd, N. A.; Grant Willson, C.* Unusual thermal properties of certain poly(3,5-disubstituted styrene)s. *Macromolecules* **2020**, *53* (13),

5504-5511.

- [23] Choi, J.; Kim, S.-S.; Chung, Y.-S.; Lee, S.* Evolution of structural inhomogeneity in polyacrylonitrile fibers by oxidative stabilization. *Carbon* **2020**, *165*, 225-237.
- [22] Kim, S.-S.[†]; Lau, C. M.[†]; Lillie, L. M.; Tolman, W. B.*; Reineke, T. M.*; Ellison, C. J.* Degradable thermoset films and fibers from carbohydrate-derived diols via thiol-ene photopolymerization. *ACS Appl. Polym. Mater.* **2019**, *1* (11), 2933-2942.
- [21] Kang, H.; Kim, S.-S.; Yoo, S. I.*; Sohn, B.-H.* Dichroic plasmon superstructures of Au nanorods over macroscopic areas via directed self-assemblies of diblock copolymers. *Adv. Mater. Interfaces* **2019**, *6* (22), 1901257.
- [20] Kim, G.; Kim, S.-S.; Jeon, J.; Yoon, S. I.; Hong, S.; Cho, Y. J.; Misra, A.; Ozdemir, S.; Ghazaryan, D.; Holwill, M.; Mishchenko, A.; Andreeva, D. V.; Kim, Y.-J.; Jeong, H.-Y.; Jang, A.-R.; Chung, H.J.; Geim, A. K.; Novoselov, K. S.*; Sohn, B.-H.*; Shin, H. S.* Planar and van der Waals heterostructures for vertical tunnelling single electron transistors. *Nat. Commun.* **2019**, *10*, 230.
- [19] Bratton, A. F.; Kim, S.-S.; Ellison, C. J.; Miller, K. M.* Thermomechanical and conductive properties of thiol-ene poly(ionic liquid) networks containing backbone and pendant imidazolium groups. *Ind. Eng. Chem. Res.* **2018**, *57* (48), 16526-16536.
- [18] Xu, J.; Eagan, J. M.; Kim, S.-S.; Pan, S.; Lee, B.; Klimovica, K.; Jin, K.; Lin, T.-W.; Howard, M. J.; Ellison, C. J.; LaPointe, A. M.*; Coates, G. W.*; Bates, F. S.* Compatibilization of isotactic polypropylene (*i*PP) and high-density polyethylene (HDPE) with *i*PP-PE multiblock copolymers. *Macromolecules* **2018**, *51* (21), 8585-8596.
- [17] Jin, K.; Kim, S.-S.; Xu, J.; Bates, F. S.*; Ellison, C. J.* Melt-blown cross-linked fibers from thermally reversible diels-alder polymer networks. *ACS Macro Lett.* **2018**, *7* (11), 1339-1345.
- [16] Kim, S.-S.; Ha, H.; Ellison, C. J.* Soybean oil-based thermoset films and fibers with high biobased carbon content via thiol-ene photopolymerization. *ACS Sustainable Chem. Eng.* **2018**, *6* (7), 8364-8373.
- [15] Kim, S.-S.*; Kang, D.; Sohn, B.-H.* Fabrication of size-controlled nanoring arrays by selective incorporation of ionic liquids in diblock copolymer micellar cores. *Nanotechnology* **2017**, *28* (22), 225303.
- [14] Oh, H.; Jo, J.; Tchoe, Y.; Yoon, H.; Lee, H. H.; Kim, S.-S.; Kim, M.; Sohn, B.-H.; Yi, G.-C.* Centimeter-size epitaxial h-BN films, *NPG Asia Mater.* **2016**, *8*, e330.
- [13] Lee, S.; Jang, S.; Kim, K.; Jeon, J.; Kim, S.-S.; Sohn, B.-H.* Branched and crosslinked supracolloidal chains with diblock copolymer micelles having three well-defined patches. *Chem. Commun.* **2016**, *52* (60), 9430-9433.
- [12] Kim, S.-S.; Sohn, B.-H.* Catalytic tailoring of large-area reduced graphene oxide by tunable arrays of Pt nanostructures synthesized from self-assembling diblock copolymers. *Carbon* **2016**, *107*, 124-131.
- [11] Kim, S.-S.; Sohn, B.-H.* Template-assisted self-assembly of diblock copolymer micelles for non-hexagonal arrays of Au nanoparticles. *RSC Adv.* **2016**, *6* (47), 41331-41339.
- [10] Kim, S.-S.[†]; Park, M. J.[†]; Kim, J.-H.; Ahn, G.; Ryu, S.; Hong, B. H.*; Sohn, B.-H.* Strain-assisted wafer-scale nanoperforation of single-layer graphene by arrayed Pt nanoparticles. *Chem. Mater.* **2015**, *27* (20), 7003-7010.
- [9] Han, D.[†]; Kim, S.-S.[†]; Kim, Y.-R.; Sohn, B.-H.*; Chung, T. D.* Surface coverage and size effects on electrochemical oxidation of uniform gold nanoparticles. *Electrochem.*

Commun. **2015**, *53*, 11-14.

- [8] Seo, M.-S.; Kim, J.-H.; Kim, S.-S.; Kang, H.; Sohn, B.-H.* Transferrable superhydrophobic TiO₂ nanorods on reduced graphene oxide films using block copolymer templates. *Nanotechnology* **2015**, *26* (16), 165302.
- [7] Kim, J.-H. Kim, S.-S.; Sohn, B.-H.* ZnO nanorods and nanowalls directly synthesized on flexible substrates with block copolymer templates. *J. Mater. Chem. C* **2015**, *3* (7), 1507-1512.
- [6] Kim, H.; Lim, Y.; Kim, S.; Kim, S.-S.; Sohn, B.-H.* Nanoscale arrangement of diblock copolymer micelles with Au nanorods. *Nanotechnology* **2014**, *25* (45), 455602.
- [5] Kim, Y.-J.†; Kim, S.-S.†; Park, J. B.; Sohn, B.-H.*; Yi, G.-C.* Controlled growth of inorganic nanorod arrays using graphene nanodot seed layers. *Nanotechnology* **2014**, *25* (13), 135609.
- [4] Kim, S.-S.†; Kim, Y.-R.†; Chung, T. D.*; Sohn, B.-H.* Tunable decoration of reduced graphene oxide with Au nanoparticles for the oxygen reduction reaction. *Adv. Funct. Mater.* **2014**, *24* (19), 2764-2771. (inside cover; selected as one of Hottest Articles from the Advanced Materials family)
- [3] Kim, Y.-J.; Tukiman, H.; Lee, C.-H.; Kim, S.-S.; Park, J.; Sohn, B.-H.; Kim, M.; Yi, G.-C.; Jung, R.; Liu, C.* Hydrothermal growth of ZnO microstructures on Ar plasma treated graphite. *Curr. Appl. Phys.* **2013**, *14* (3), 269-274.
- [2] Suh, Y. J.; Lu, N.; Park, S. Y.; Lee, T. H.; Lee, S. H.; Cha, D. K.; Lee, M. G.; Huang, J.; Kim, S.-S.; Sohn, B.-H.; Kim, G.-H.; Ko, M. J. Kim, J.; Kim, M. J.* Three-dimensional observation of TiO₂ nanostructures by electron tomography. *Micron* **2013**, *46*, 35-42.
- [1] Kim, S.-S.; Choi, J.-Y.; Kim, K.; Sohn, B.-H.* Large area tunable arrays of graphene nanodots fabricated using diblock copolymer micelles. *Nanotechnology* **2012**, *23* (12), 125301.

■ Manuscripts under Peer Review and Pre-prints

■ Conference Presentations

- [30] Kim, S.-S.; Effective carbonization of plant-derived precursor fibers through accelerated thermostabilization. Spring Conference of the Korean Fiber Society, Jeju, Korea, Apr 19-21, 2023.
- [29] Kim, S.-S.; Irradiation techniques for accelerated thermostabilization of lignin derivatives as precursors of carbon fibers. Spring Conference of the Korean Society for Composite Materials, Jeju, Korea, May 18-20, 2022.
- [28] Kim, S.-S.; UV-assisted oxidative cross-linking for the efficient manufacturing of lignin-derived carbon fibers. Fall Meeting of the Polymer Society of Korea, Gyeongju, Korea, Oct 21-22, 2021.
- [27] Kim, S.-S.; Lau, C. M.; Lillie, L. M.; Tolman, W. B.; Reineke, T. M.; Ellison, C. J. Degradable thermoset fibers containing renewable carbohydrate-derived diol subunits. The 258th American Chemical Society National Meeting & Exposition, San Diego,

CA, Aug 25-29, 2019.

- [26] Kim, S.-S. Catalytic nanopatterning of graphene using arrayed Pt nanostructures synthesized from thin films of diblock copolymers. Spring Meeting of the Korean Carbon Society, Daegu, Korea, May 16-17, 2019.
- [25] Kim, S.-S.; Ha, H.; Ellison, C. J. All soybean oil-based thermoset films and fibers with high biorenewable content. The 256th American Chemical Society National Meeting & Exposition, Boston, MA, Aug 19-23, 2018.
- [24] Kim, S.-S.; Ha, H.; Ellison, C. J. Thiol-ene photopolymerizations for manufacturing high-performance fibers. Annual Meeting of Industrial Partnership for Research in Interfacial & Materials Engineering, Minneapolis, MN, May 29-31, 2018.
- [23] Kim, S.-S.; Janes, D. W.; Shanmuganathan, K.; Chou, D. Y.; Ellison, C. J. Soybean oil based thermoset materials with high biorenewable content. Annual Meeting of American Institute of Chemical Engineers, Minneapolis, MN, Oct 29-Nov 3, 2017.
- [22] Kim, S.-S.; Young, W. W.; Oquendo, L. E.; Maher, M. J.; Zhou, S.; Asano, Y.; Hillmyer, M. A.; Wilson, C. G.; Ellison, C. J. High- χ block copolymers with high etch selectivity for sub-10 nm patterning. Annual Meeting of American Institute of Chemical Engineers, Minneapolis, MN, Oct 29-Nov 3, 2017.
- [21] Kim, S.-S.; Fang, Y.; Ellison, C. J. Thiol-ene photopolymerizations for manufacturing high-performance fibers. Annual Meeting of Industrial Partnership for Research in Interfacial & Materials Engineering, Minneapolis, MN, May 30-Jun 1, 2017.
- [20] Kim, S.-S.; Lee, C. S.; Sohn, B.-H. Directed self-assemblies of diblock copolymers for ordered inorganic nanostructures. The 251st American Chemical Society National Meeting & Exposition, San Diego, CA, Mar 13-17, 2016.
- [19] Kim, S.-S.; Sohn, B.-H. Nanopatterning of reduced graphene oxide by Pt nanostructures synthesized from diblock copolymers. Materials Research Society Spring Meetings & Exhibits, San Francisco, CA, Apr 6-10, 2015.
- [18] Kim, S.-S.; Sohn, B.-H. Pt nanostructures synthesized from diblock copolymers and their micelles to tailor large-area graphene. Materials Research Society Fall Meetings & Exhibits, Boston, MA, Nov 30-Dec 5, 2014.
- [17] Kim, S.-S.; Sohn, B.-H. Diblock copolymers and their micelles to fabricate catalytic Pt nanostructures for graphene etching. Fall Meeting of the Polymer Society of Korea, Jeju, Korea, Oct 6-8, 2014.
- [16] Kim, S.-S.; Kang, H.; Sohn, B.-H. Reduced graphene oxide films tailored by Pt nanostructures synthesized from diblock copolymers and their micelles. Spring Meeting of the Polymer Society of Korea, Daejeon, Korea, Apr 10-11, 2014.
- [15] Kim, S.-S.; Park, M. J.; Hong, B.H.; Sohn, B.-H. Arrays of Pt nanoparticles synthesized from diblock copolymer micelles for the perforation of graphene films. Korea-Germany International Research Training Group Symposium on Self-Organized Materials for Optoelectronics. Daejeon, Korea, Feb 17-22, 2014.
- [14] Kim, S.-S.; Park, M. J.; Hong, B.H.; Sohn, B.-H. Large-area nanoperforated graphene by arrays of nanoparticles fabricated from diblock copolymer micelles. Materials Research Society Fall Meetings & Exhibits, Boston, MA, Dec 1-6, 2013.
- [13] Kim, S.-S.; Sohn, B.-H. Complex arrays of titania nanostructures and metal nanoparticles fabricated by diblock copolymers and their micelles. The 112nd General Meeting of the Korean Chemical Society, Changwon, Korea, Oct 16-18, 2013.
- [12] Kim, S.-S.; Kim, J.-H.; Sohn, B.-H. Nanopatterning of reduced graphene oxide films by arrays of nanoparticles fabricated by diblock copolymer micelles. German-Korean

Polymer Symposium, Hamburg, Germany, Aug 26-30, 2013.

- [11] Kim, S.-S.; Chae, S.; Lee, J.-K.; Sohn, B.-H. Transferable graphene films with nanoparticles by diblock copolymer micelles for electrochemical applications. Spring Meeting of the Polymer Society of Korea, Daejeon, Korea, Apr 11-12, 2013.
- [10] Kim, S.-S.; Kim, Y.-R.; Sohn, B.-H. Graphene films with arrays of nanoparticles by diblock copolymer micelles and their electrochemical properties. Korea-Germany International Research Training Group Symposium on Self-Organized Materials for Optoelectronics. Seoul, Korea, Feb 25-28, 2013.
- [9] Kim, S.-S.; Kim, Y.-R.; Sohn, B.-H. Nanopatterned and nanoparticle-decorated graphene in large area fabricated by diblock copolymer micelles. Materials Research Society Fall Meetings & Exhibits, Boston, MA, Nov 25-30, 2012.
- [8] Kim, S.-S.; Sohn, B.-H. Graphene decorated with arrays of tunable nanoparticles fabricated by diblock copolymer micelles. The 24th International Liquid Crystal Conference, Mainz, Germany, Aug 19-24, 2012.
- [7] Kim, S.-S.; Lee, Y.; Kim, J.-H.; Ku, S.; Sohn, B.-H. Fabrication of nanostructured titanium dioxides by nanotemplates of block copolymers. Institute of Electrical and Electronics Engineers Nanotechnology Materials and Device Conference, Jeju, Korea, Oct 18-21, 2011.
- [6] Kim, S.-S.; Kim, J.-H.; Ku, S.; Sohn, B.-H. Tunable and transferable arrays of Au nanoparticles on reduced graphene oxides. Fall Meeting of the Polymer Society of Korea, Gwangju, Korea, Oct 6-7, 2011.
- [5] Kim, S.-S.; Kim, J.-H.; Lee, Y.; Sohn, B.-H. Thin films of diblock copolymers and their micelles for the fabrication of inorganic nanostructures. The 242nd American Chemical Society National Meeting & Exposition, Denver, CO, Aug 28-Sep 1, 2011.
- [4] Kim, S.-S.; Kim, J.-H.; Chae, S.; Sohn, B.-H. Graphene nanodot arrays by diblock copolymer micelles. Spring Meeting of the Polymer Society of Korea, Daejeon, Korea, Apr 7-8, 2011.
- [3] Kim, S.-S.; Lee, Y.; Sohn, B.-H. Fabrication of nanostructured inorganic materials by self-assemblies of diblock copolymers. The 241st American Chemical Society National Meeting & Exposition, Anaheim, CA, Mar 27-31, 2011.
- [2] Kim, S.-S.; Jeon, S.-M; Kim, H. K.; Lee, Y.; Sohn, B.-H. Self-assemblies of diblock copolymers for nanostructured carbon and inorganic materials. The 240th American Chemical Society National Meeting & Exposition, Boston, MA, Aug 22-26, 2010.
- [1] Kim, S.-S.; Sohn, B.-H. Diblock copolymer micelle lithography for the fabrication of nanostructured carbon materials. Fall Meeting of the Polymer Society of Korea, Daegu, Korea, Oct 7-8, 2010.

■ Patents

- [6] Kim, S.-S.; Shin, H.Y.; Jo, S. M.; Lee, S. Oxidatively depolymerized lignin and manufacturing method thereof, and UV-blocking composition including the same. CN-202210796233.1.
- [5] Kim, S.-S.; Shin, H.Y.; Jo, S. M.; Lee, S. Oxidatively depolymerized lignin and manufacturing method thereof, and UV-blocking composition including the same. KR 10-2022-0025514.

- [4] Kim, S.-S.; Jo, S. M.; Kim, C. S.; Lee, S. Fatty acid-functionalized lignin, spinning fiber and carbon fiber manufactured from the same, and manufacturing method thereof. PCT/KR2021/000966.
 - [3] Kim, S.-S.; Jo, S. M.; Kim, C. S.; Lee, S. Fatty acid-functionalized lignin, spinning fiber and carbon fiber manufactured from the same, and manufacturing method thereof. KR 10-2021-0009528.
 - [2] Sohn, B.-H.; Seo, M.-S.; Kim, S.-S.; Han, C.-S. Transferring method of nanorod. KR 10-1754783, Jun 30, 2017.
 - [1] Sohn, B.-H.; Han, C.-S.; Woo, J. Y.; Kim, S.-S. Fabricating method of graphene decorated with nanoparticles. KR 10-1620875-0000, May 9, 2016.
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