

# Prof. Seon-Jin Choi



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## EDUCATION

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- **Postdoctoral researcher, Department of Chemistry** **Nov. 2017~ Aug. 2019**
  - ✓ Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts, United States
  - ✓ Research Thesis: Anion detection in solution for environmental monitoring
  - ✓ Advisor: Prof. Timothy M. Swager
- **Postdoctoral researcher, Applied Science Research Institute** **Mar. 2016 ~ Aug. 2017**
  - ✓ Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea
  - ✓ Research Thesis: Flexible and stretchable chemical sensors for wearable application
  - ✓ Advisor: Prof. Il-Doo Kim
- **Ph.D., Materials Science and Engineering** **Feb. 2012 ~ Feb. 2016**
  - ✓ Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea
  - ✓ Research Thesis: Development of semiconductor metal oxide-based chemical sensors for pattern recognition of biomarkers in exhaled breath.
  - ✓ Advisor: Prof. Il-Doo Kim
- **M.S., Electrical Engineering** **Feb. 2010 ~ Feb. 2012**
  - ✓ Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea
  - ✓ Research Thesis: Development of low-temperature, high- $\kappa$  dielectric material of  $\text{TiO}_2$  for RF MEMS device with high self-resonant frequency.
  - ✓ Advisor: Prof. Jun-Bo Yoon
- **B.S., Materials Science and Engineering** **Mar. 2006 ~ Feb. 2010**
  - ✓ Hanyang University, Seoul, South Korea.
  - ✓ Advisor: Prof. Won-Il Park

## PUBLICATIONS

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### ● INTERNATIONAL JOURNALS

68. Hee-Jin Cho, **Seon-Jin Choi**, Nam-Hoon Kim, and Il-Doo Kim, "Porosity Controlled 3D  $\text{SnO}_2$  Spheres via Electrostatic Spray: Selective Acetone Sensors" *Sensors and Actuators B*, Vol. 304, pp. 127350, 2020
67. **Seon-Jin Choi**, Bora Yoon, Jason D. Ray, Anton Netchaev, Lee C. Moores, and Timothy M. Swager "Chemiresistors for the Real-Time Wireless Detection of Anions" *Advanced Functional Materials*, pp. 1907087, 2019 (In-press)
66. **Seon-Jin Choi**, Suchol Savagatrup, Yoonseob Kim, Jeffrey H. Lang and Timothy M. Swager, "Precision pH

Sensor Based on WO<sub>3</sub> Nanofiber-Polymer Composites and Differential Amplification” *ACS Sensors*, 2019, Vol. 4, No. 10, pp. 2593–2598, 2019.

65. Won-Tae Koo, Yoonseob Kim, Suchol Savagatrup, Bora Yoon, Intak Jeon, **Seon-Jin Choi**, Il-Doo Kim, and Timothy M. Swager, “Porous Ion Exchange Polymer Matrix for Ultrasmall Au Nanoparticle-Decorated Carbon Nanotube Chemiresistors” *Chemistry of Materials*, Vol. 31, No. 15, pp. 5413–5420, 2019.
64. Ji-Soo Jang, Sang-Eun Lee, **Seon-Jin Choi**, Won-Tae Koo, Dong-Ha Kim, Hamin Shin, Hee Jung Park, and Il-Doo Kim, “Heterogeneous, Porous 2D Oxide Sheets via Rapid Galvanic Replacement: Toward Superior HCHO Sensing Application” *Advanced Functional Materials*, Vol. 29, pp. 1903012, 2019.
63. Ting Zheng, Parisa P.S.S. Abadi, Jungmok Seo, Byung-Hyun Cha, Beatrice Miccoli, Yi-Chen Li, Kijun Park, Kijun Park, Sunghyun Park, **Seon-Jin Choi**, Rasoul Bayaniahangar, Dongxing Zhang, Soo-Hong Lee, Chang-Kee Lee, Ali Khademhosseini, and Su Ryon Shin “Biocompatible Carbon Nanotube-Based Hybrid Microfiber for Implantable Electrochemical Actuator and Flexible Electronic Applications” *ACS Applied Materials & Interfaces*, Vol 11, No. 23, pp. 20615–20627, 2019.
62. **Seon-Jin Choi**, Dong-Myeong Lee, Hayoung Yu, Ji-Soo Jang, Min-Hyeok Kim, Hyeon Su Jeong, and Il-Doo Kim, “All-carbon fiber-based chemical sensor: Improved reversible NO<sub>2</sub> reaction kinetics” *Sensors and Actuators B*, Vol. 290, No. 1, pp. 293–301, 2019.
61. Ji-Soo Jang, Hayoung Yu, **Seon-Jin Choi**, Won-Tae Koo, Jiyoung Lee, Dong-Ha Kim, Joon-Young Kang, Yong-Jin Jeong, Hyeonsu Jung, and Il-Doo Kim, “Heterogeneous Metal Oxide–Graphene Thorn-Bush Single Fiber as a Freestanding Chemiresistor” *ACS Applied Materials & Interfaces*, Vol. 11, No. 10, pp. 10208–10217, 2019.
60. Doo-Young Youn,\* Uihyun Jung,\* Muhammad Naqi,\* **Seon-Jin Choi**,\* Min-Goo Lee, Sungho Lee, Hi-Joon Park, Il-Doo Kim, Sunkook Kim, “Wireless Real-Time Temperature Monitoring of Blood Packages: Silver Nanowire-Embedded Flexible Temperature Sensors” *ACS Applied Materials & Interfaces*, Vol. 10, No. 51, pp. 44678–44685, 2018. (\*equally corresponded to this work)
59. Bora Yoon, **Seon-Jin Choi**, Timothy M. Swager, and Gary F. Walsh, “Switchable Single-Walled Carbon Nanotube–Polymer Composites for CO<sub>2</sub> Sensing” *ACS Applied Materials & Interfaces*, Vol. 10, No. 39, pp 33373-33379, 2018.
58. Won-Tae Koo, Jun-Hwe Cha, Ji-Won Jung, **Seon-Jin Choi**, Ji-Soo Jang, Dong-Ha Kim, and Il-Doo Kim, “Few-Layered WS<sub>2</sub> Nanoplates Confined in Co, N-Doped Hollow Carbon Nanocages: Abundant WS<sub>2</sub> Edges for Highly Sensitive Gas Sensors” *Advanced Functional Materials*, Vol. 28, pp 1802575, 2018. (Frontispiece featured)
57. Dong-Ha Kim, Ji-Won Jung, **Seon-Jin Choi**, Ji-Soo Jang, Won-Tae Koo, and Il-Doo Kim, “Pt nanoparticles functionalized tungsten oxynitride hybrid chemiresistor: Low-temperature NO<sub>2</sub> sensing” *Sensors and Actuators B*, Vol. 273, pp 1269–1277, 2018.
56. Hee Jung Park, Kimoon Lee, Il-Doo Kim, **Seon-Jin Choi**, and Byungki Ryu, “Abnormal Optoelectric Properties of Two-Dimensional Protonic Ruthenium Oxide with a Hexagonal Structure” *ACS Applied Materials & Interfaces*, Vol. 10, pp 22661–22668, 2018.
55. Min-Hyeok Kim, Ji-Soo Jang, Won-Tae Koo, **Seon-Jin Choi**, Sang-Joon Kim, Dong-Ha Kim, and Il-Doo Kim, “Bimodally Porous WO<sub>3</sub> Microbelts Functionalized with Pt Catalysts for Selective H<sub>2</sub>S Sensors” *ACS Applied Materials & Interfaces*, Vol. 10, pp 20643–20651, 2018.
54. Jun-Hwe Cha, Dong-Ha Kim, **Seon-Jin Choi**, Won-Tae Koo, and Il-Doo Kim, “Sub-Parts-per-Million Hydrogen Sulfide Colorimetric Sensor: Lead Acetate Anchored Nanofibers toward Halitosis Diagnosis” *Analytical Chemistry*, Vol. 90, No. 15, pp 8769–8775, 2018. (Front cover-featured)
53. Dong-Ha Kim, Ji-Soo Jang, Won-Tae Koo, **Seon-Jin Choi**, Hee-Jin Cho, Min-Hyeok Kim, Sang-Joon Kim, and Il-Doo Kim, “Bioinspired Cocatalysts Decorated WO<sub>3</sub> Nanotube Toward Unparalleled Hydrogen Sulfide Chemiresistor” *ACS Sensors*, Vol. 3, pp 1164–1173, 2018.

52. Min-Ho Seo, **Seon-Jin Choi**, Sang Hyun Park, Jae-Young Yoo, Sung Kyu Lim, Jae-Shin Lee, Kwang-Wook Choi, Min-Seung Jo, Il-Doo Kim, and Jun-Bo Yoon, “Material-Independent Nanotransfer onto a Flexible Substrate Using Mechanical-Interlocking Structure” *ACS Nano*, Vol. 12, No. 5, pp 4387–4397, 2018.
51. **Seon-Jin Choi**, Hayoung Yu, Ji-Soo Jang, Min-Hyeok Kim, Hyeon Su Jeong, and Il-Doo Kim, “Nitrogen-Doped Single Graphene Fiber with Platinum Water Dissociation Catalyst for Wearable Humidity Sensor”, *Small*, Vol. 14, pp. 1703934, 2018. (Front cover-featured)
50. **Seon-Jin Choi\*** and Il-Doo Kim\*, “Recent Developments in 2D Nanomaterials for Chemiresistive-Type Gas Sensors” (Invited Review) *Electronic Materials Letters*, Vol. 14, No. 3, pp. 221–260, 2018. (\*equally corresponded to this work) (Front cover-featured)
49. Dong-Ha Kim, Ji-Soo Jang, Won-Tae Koo, **Seon-Jin Choi**, Sang-Joon Kim, and Il-Doo Kim, “Hierarchically interconnected porosity control of catalyst-loaded WO<sub>3</sub>nanofiber scaffold: Superior acetone sensing layers for exhaled breath analysis” *Sensors and Actuators B*, Vol. 259, pp. 616–625, 2018.
48. Tran Thi Dung, Yunkwang Oh, **Seon-Jin Choi**, Il-Doo Kim, Min-Kyu Oh, Moonil Kim, “Applications and Advances in Bioelectronic Noses for Odour Sensing” (Review), *Sensors*, Vol. 18, No. 1, pp. 103, 2018.
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42. Sang-Joon Kim, **Seon-Jin Choi**, Ji-Soo Jang, Hee-Jin Cho, Won-Tea Koo, and Il-Doo Kim, “Exceptional High-Performance of Pt Based Bimetallic Catalysts for Exclusive Detection of Exhaled Biomarkers” *Advanced Materials*, Vol. 29, No. 36, pp. 1700737, 2017. (Front cover-featured)
41. Ji-Soo Jang, **Seon-Jin Choi**, Won-Tae Koo, Sang-Joon Kim, Jun Young Cheong, and Il-Doo Kim, “Elaborate Manipulation for Sub-10 nm Hollow Catalyst Sensitized Heterogeneous Oxide Nanofibers for Room Temperature Chemical Sensors” *ACS Applied Materials & Interfaces*, Vol. 9, No. 29, pp. 24821-24829, 2017.
40. Won-Tae Koo, Ji-Soo Jang, **Seon-Jin Choi**, Hee-Jin Cho, and Il-Doo Kim, “Metal-Organic Framework Templated Catalysts: Dual Sensitization of PdO-ZnO Composite on Hollow SnO<sub>2</sub> Nanotubes for Selective Acetone Sensors” *ACS Applied Materials & Interfaces*, Vol. 9, No. 21, pp. 18069-18077, 2017.
39. Sang-Joon Kim,\* **Seon-Jin Choi**,\* Ji-Soo Jang, Hee-Jin Cho, and Il-Doo Kim, “Innovative Nanosensor for Disease Diagnosis” (Invited Review) *Accounts of Chemical Research*, Vol. 50, No. 7, pp. 1587-1596, 2017 (\*equally contributed to this work) (Front cover-featured)

38. Jun-Hwe Cha, Seon-Jin Choi, Sunmoon Yu, and Il-Doo Kim, “2D WS<sub>2</sub>-Edge Functionalized Multi-Channel Carbon Nanofibers: Effect of WS<sub>2</sub> Edge-Abundant Structure on Room-Temperature NO<sub>2</sub> Sensing” *Journal of Materials Chemistry A*, Vol. 5, pp. 8725-8732, 2017.
37. Seon-Jin Choi,\* Luana Persano,\* Andrea Camposeo,\* Ji-Soo Jang, Won-Tae Koo, Hee-Jin Cho, Sang-Joon Kim, Il-Doo Kim, and Dario Pisignano, “Electrospun Nanostructures for High Performance Chemiresistive and Optical Sensors” (Invited Review) *Macromolecular Materials and Engineering*, Vol. 302, pp. 1600569, 2017. (\*equally contributed to this work) (Featured in Advanced Science News) (Front cover-featured)
36. Won-Tae Koo, Sunmoon Yu, Seon-Jin Choi, Ji-Soo Jang, Jun Young Cheong, and Il-Doo Kim, “Nanoscale PdO Catalyst Functionalized Co<sub>3</sub>O<sub>4</sub> Hollow Nanocages using MOF Templates for Selective Detection of Acetone Molecules in Exhaled Breath”, *ACS Applied Materials & Interfaces*, 2017, Vol. 9, No. 9, pp. 8201-8210, 2017.
35. Won-Tae Koo, Seon-Jin Choi, Ji-Soo Jang, and Il-Doo Kim, “Metal-Organic Framework Templated Synthesis of Ultrasmall Catalyst Loaded ZnO/ZnCo<sub>2</sub>O<sub>4</sub> Hollow Spheres for Enhanced Gas Sensing Properties” *Scientific Reports*, Vol. 7, No. 45074, 2017.
34. Seon-Jin Choi, Ji-Soo Jang, Hee Jung Park, and Il-Doo Kim, “Optically Sintered 2D RuO<sub>2</sub> Nanosheets: Temperature-Controlled NO<sub>2</sub> Reaction”, *Advanced Functional Materials*, Vol. 27, No. 13, pp. 1606026, 2017. (Front cover-featured)
33. Hee-Jin Cho, Sang-Joon Kim, Seon-Jin Choi, Ji-Soo Jang, Moonil Kim, and Il-Doo Kim, “Facile synthetic method of catalyst-loaded ZnO nanofibers compositesensor arrays using bio-inspired protein cages for pattern recognitionof exhaled breath”, *Sensors and Actuators B: Chemical*, Vol. 243, pp. 166-175, 2017.
32. Kwang-Hun Kim, Sang-Joon Kim, Hee-Jin Cho, Nam-Hoon Kim, Ji-Soo Jang, Seon-Jin Choi, and Il-Doo Kim, “WO<sub>3</sub> nanofibers functionalized by protein-templated RuO<sub>2</sub> nanoparticles as highly sensitive exhaled breath gas sensing layers”, *Sensors and Actuators B: Chemical*, Vol. 241, pp. 1276-1282, 2017.
31. Won-Tae Koo, Seon-Jin Choi, Sang-Joon Kim, Ji-Soo Jang, Harry L. Tuller, and Il-Doo Kim, “Heterogeneous Sensitization of Metal-Organic Framework Driven Metal@Metal Oxide Complex Catalysts on Oxide Nanofiber Scaffold toward Superior Gas Sensors”, *Journal of the American Chemical Society (JACS)*, Vol. 138, No. 40, pp. 13431-13437, 2016.
30. Seon-Jin Choi,\* Kang Hee Ku,\* Bumjoon J. Kim, and Il-Doo Kim, “Novel Templating Route Using Pt Infiltrated Block Copolymer Microparticles for Catalytic Pt Functionalized Macroporous WO<sub>3</sub> Nanofibers and Its Application in Breath Pattern Recognition”, *ACS Sensors*, Vol. 1, pp. 1124-1131, 2016. (\*equally contributed to this work)
29. Seon-Jin Choi, Sang-Joon Kim, Ji-Soo Jang, Ji-Hyun Lee, and Il-Doo Kim, “Silver nanowire embedded colorless polyimide heater for wearable chemical sensors: Improved reversible reaction kinetics of optically reduced graphene oxide”, *Small*, Vol. 12, No. 42, pp. 5826-5835, 2016. (Front cover-featured)
28. Ji-Soo Jang, Sunmoon Yu, Seon-Jin Choi, Sang-Joon Kim, Won-Tae Koo, and Il-Doo Kim, “Metal chelation assisted in-situ migration and functionalization of catalysts on peapod-like hollow SnO<sub>2</sub> toward superior chemical sensor”, *Small*, Vol. 12, No. 43, pp. 5989-5997, 2016.
27. Seon-Jin Choi, Sang-Joon Kim, and Il-Doo Kim, “Ultrafast optical reduction of graphene oxide sheets on colorless polyimide film for wearable chemical sensors”, *NPG Asia Materials*, Vol. 8, No. e315, pp. 1-10, 2016.
26. Sang-Joon Kim, Seon-Jin Choi, Ji-Soo Jang, Nam-Hoon Kim, Meggie Hakim, Harry L. Tuller, and Il-Doo Kim, “Mesoporous WO<sub>3</sub> Nanofibers with Protein Templated Nanoscale Catalysts for Detection of Trace Biomarkers in Exhaled Breath”, *ACS Nano*, Vol. 10, pp. 5891-5899, 2016.
25. Ji-Soo Jang, Seon-Jin Choi, Sang-Joon Kim, Meggie Hakim, and Il-Doo Kim, “Rational design of highly porous SnO<sub>2</sub> nanotubes functionalized with biomimetic nanocatalysts for direct observation of simulated diabetes” *Advanced Functional Materials*, Vol. 26, pp. 4740-4748, 2016.



24. **Seon-Jin Choi**, Saptarshi Chattopadhyay, Jae Jin Kim, Sang-Joon kim, Harry L. Tuller, Gregory C. Rutledge, and Il-Doo Kim, “Coaxial electrospinning of WO<sub>3</sub> nanotubes functionalized with bio-inspired catalysts and its superior hydrogen sensing performances”, *Nanoscale*, Vol. 8, pp. 9159-9166, 2016. **(Back cover-featured)**
23. **Seon-Jin Choi**, Sang-Joon Kim, Hee-Jin Cho, Ji-Soo Jang, Yi-Min Lin, Harry L. Tuller, Gregory C. Rutledge, and Il-Doo Kim, “WO<sub>3</sub> nanofiber-based biomarker detectors enabled by protein-encapsulated catalyst self-assembled on polystyrene colloid templates”, *Small*, Vol. 12, No. 7, pp. 911-920, 2016. **(Back cover-featured)**
22. Hak-Jong Choi,\* **Seon-Jin Choi**,\* Soyoung Choo, Il-Doo Kim, and Heon Lee, “Hybrid Direct Imprinting and Hydrothermal Growth of Sb-doped SnO<sub>2</sub>-ZnO Hierarchical Structure for Selective Detection of Acetone Molecules”, *Scientific Reports*, Vol. 6, No. 18731, 2016. **(\*equally contributed to this work)**
21. Nam-Hoon Kim, **Seon-Jin Choi**, Sang-Joon Kim, Hee-Jin Cho, Ji-Su Jang, Won-Tae Koo, Moonil Kim and Il-Doo Kim, “Highly Sensitive and Selective Acetone Sensing Performance of WO<sub>3</sub> Nanofibers Functionalized by Rh<sub>2</sub>O<sub>3</sub> Nanoparticles”, *Sensors and Actuators B: Chemical*, Vol. 224, pp. 185-192, 2016.
20. Won-Tae Koo, **Seon-Jin Choi**, Nam-Hoon Kim, Ji-Soo Jang, and Il-Doo Kim, “Catalyst-decorated hollow WO<sub>3</sub> nanotubes using layer-by-layer self-assembly on polymeric nanofiber templates and their application in exhaled breath sensor”, *Sensors and Actuators B: Chemical*, Vol. 223, pp. 301-310, 2016.
19. Ji-Soo Jang, Sang-Joon Kim, **Seon-Jin Choi**, Nam-Hoon Kim, Meggie Hakim, Avner Rothschild and Il-Doo Kim, “Thin-walled SnO<sub>2</sub> nanotubes functionalized with Pt and Au catalysts via protein templating route and their selective detection of acetone and hydrogen sulfide molecules”, *Nanoscale*, Vol. 7, pp. 16417-16426, 2015.
18. Hyun-Ho Yang, Chang-Hoon Han, **Seon-Jin Choi**, Dong-Hoon Choi, and Jun-Bo Yoon, “Signal Power-insensitive Analog MEMS Tunable Capacitor by Immobilizing the Movable Plates”, *IEEE/ASME Journal of Microelectromechanical Systems (IEEE JMEMS)*, Vol. 24, No. 5, pp. 1545-1556, 2015.
17. **Seon-Jin Choi**, Chanyong Choi, Sang-Joon Kim, Hee-Jin Cho, Meggie Hakim, Seokwoo Jeon, and Il-Doo Kim, “Highly Efficient Electronic Sensitization of Non-oxidized Graphene Flakes on Controlled Pore-loaded WO<sub>3</sub> Nanofibers for Selective Detection of H<sub>2</sub>S Molecules”, *Scientific Reports*, Vol. 5, No. 8067, 2015.
16. **Seon-Jin Choi**, Sang-Joon Kim, Won-Tae Koo, Hee-Jin Cho, and Il-Doo Kim, “Catalyst-loaded porous WO<sub>3</sub> nanofibers using catalyst-decorated polystyrene colloid templates for detection of biomarker molecules”, *Chemical Communications*, Vol. 51, pp. 2609-2612, 2015.
15. **Seon-Jin Choi**, Chanyong Choi, Sang-Joon Kim, Hee-Jin Cho, Seokwoo Jeon, and Il-Doo Kim, “Facile synthesis of hierarchical porous WO<sub>3</sub> nanofibers having 1D nanoneedles and their functionalization with non-oxidized graphene flakes for selective detection of acetone molecules”, *RSC Advances*, Vol. 5, pp. 7584-7588, 2015.
14. **Seon-Jin Choi**,\* Chang-Hoon Han,\* Hyun-Ho Yang, Dong-Hoon Choi and Jun-Bo Yoon, “Increasing Capacitance and Self-Resonant Frequency of the MEMS Switched Capacitor Using High- $\kappa$  TiO<sub>2</sub> and SU-8 Bridged Beam Structure”, *IEEE/ASME Journal of Microelectromechanical Systems (IEEE JMEMS)*, Vol. 24, No. 4, pp. 1006-1015, 2015. **(\*equally contributed to this work)**
13. **Seon-Jin Choi**, Won-Hee Ryu, Sang-Joon Kim, Hee-Jin Cho, and Il-Doo Kim, “Bi-functional Co-sensitization of Graphene Oxide Sheets and Ir Nanoparticles on P-type Co<sub>3</sub>O<sub>4</sub> Nanofibers for Selective Acetone Detection”, *Journal of Materials Chemistry B*, Vol. 2, pp. 7160-7167, 2014.
12. **Seon-Jin Choi**,\* Minsoo P. Kim,\* Seo-Jin Lee, Bumjoon J. Kim and Il-Doo Kim, “Facile Au catalyst loading on inner shell of hollow SnO<sub>2</sub> spheres using Au-decorated block copolymer sphere templates and their selective H<sub>2</sub>S sensing characteristics”, *Nanoscale*, Vol. 6, pp. 11898-11903, 2014. **(\*equally contributed to this work)**
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10. Ingun Lee, Seon-Jin Choi, Kwang-Min Park, Sun Sook Lee, Sungho Choi, Il-Doo Kim, and C. O. Park, "The stability, sensitivity and response transients of ZnO, SnO<sub>2</sub> and WO<sub>3</sub> sensors under acetone, toluene and H<sub>2</sub>S environments", *Sensors and Actuators B: Chemical*, Vol. 197, pp. 300-307, 2014.
  9. Seon-Jin Choi, Bong-Hoon Jang, Seo-Jin Lee, Byoung Koun Min, Avner Rothschild and Il-Doo Kim, "Selective detection of acetone and hydrogen sulfide for the diagnosis of diabetes and halitosis using SnO<sub>2</sub> nanofibers functionalized with reduced graphene oxide nanosheets", *ACS Applied Materials & Interfaces*, Vol. 6, No. 4, pp. 2588-2597, 2014.
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