

# ZHENG FAN, PH.D

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## CURRENT POSITION

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Assistant Professor in the Department of Engineering Technology, University of Houston, Texas, start from Aug. 2018

## EDUCATION

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Postdoctoral Scholar in Department of Materials Science and Engineering, University of California, Los Angeles, Jul. 2015 – Jul. 2018

- Advisor: *Dr. Xiangfeng Duan (World's top 20 materials scientists, ranked by Thomson Reuters)*

Ph.D. in Electrical & Computer Engineering, Michigan State University, since Aug. 2009 (awarded in May. 2015).

- Dissertation: *Nanorobotic end-effectors: Design, fabrication, and in situ characterization.*

M.S. in Mechanical Engineering, Shanghai Jiao Tong University, 2009

B.A. in Mechanical Engineering, Nanjing University of Science and Technology, 2006

## AWARDS AND HONORS

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2015 – 1<sup>st</sup> place of the Fitch H. Beach Award for Outstanding Graduate Researcher of the College of Engineering, MSU (\$2000)

2015 – Award for Outstanding Graduate Achievement (Department of Electrical & Computer Engineering, College of Engineering, MSU) (\$1500)

2014 – April, Finalist of the Best Student Paper on the IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS 2014) in Hawaii, USA

2013 – November, Student travel scholarship to attend the IEEE/RSJ International Conference on Intelligent Robots and Systems 2013 (IROS 2013) in Tokyo, Japan (\$1000)

- 2013 – August, Travel award to attend the 13th IEEE International Conference on Nanotechnology (IEEE-NANO 2013) in Beijing, China
- 2011 – September, Student travel scholarship to attend the IEEE/RSJ International Conference on Intelligent Robots and Systems 2011 (IROS 2011) in San Francisco, USA (\$1000)
- 2011 – August, Best Application Paper Award from International Conference on Manipulation, Measurement and Manufacturing on the Nanoscale (3M-NANO2011) (\$1000)

## **PEER-REVIEWED PUBLICATIONS**

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### ***Book Chapters***

- BC1. L. X. Dong, X. Y. Tao, **Z. Fan**, X. D. Cui, L. Zhang, X. B. Zhang, B. J. Nelson, M. Hamdi, A. Ferreira, and X. D. Fan. “Nanorobotic Mass Transport,” in *NanoRobotics: Current Approaches and Techniques*. Eds. C. Mavroidis and A. Ferreira: Springer, 2012.
- BC2. L. X. Dong, X. Y. Tao, **Z. Fan**, L. Zhang, X. B. Zhang, and B. J. Nelson. “Nanorobotic Spot Welding,” in *Encyclopedia of Nanotechnology*. Eds. B. Bharat: Springer, 2012.

### ***Journal Articles***

- JP1 **Z. Fan**, X. Hai, Y. Wang, Z. P. Zhao, H. Cheng, S. Lee, Z. Lin, G. Wang, Z. Y. Feng, W. A. Goddard, Y. Huang, X. F. Duan, Layer-by-Layer Degradation of Methylammonium Lead Tri-iodide Perovskites two-dimensional nanostructure. *Joule: Cell press*. DOI: 10.1016/j.joule.2017.08.005, 2017.
- JP2 J. Zhu, Y. Shan, T. Wang, H. T. Sun, Z. P. Zhao, L. Mei, **Z. Fan**, Z. Xu, I. Shakir, Y. Huang, B. G. Lu, X. F. Duan, A hyperaccumulation pathway to three-dimensional hierarchical porous nanocomposites for highly robust high-power electrodes. *Nat. Commun.* 7, 13432, 2016. (impact factor: 11.33)
- JP3 Z. P. Zhao, M. Feng, J. H. Zhou, Z. Y. Liu, M. F. Li, **Z. Fan**, O. Tsen, J. W. Miao, X. F. Duan, Y. Huang, Composition tunable ternary pt-ni-co octahedra for optimized oxygen reduction activity. *Chem. Commun.* 52, 11215-11218, 2016. (impact factor: 6.57)
- JP4 X. D. Duan, C. Wang, **Z. Fan**, G. L. Hao, L. Z. Kou, U. Halim, H. L. Li, X. P. Wu, Y. C. Wang, J. H. Jiang, A. L. Pan, Y. Huang, R. Q. Yu, and X. F. Duan, "Synthesis of WS<sub>2x</sub>Se<sub>2-2x</sub> Alloy Nanosheets with Composition-Tunable Electronic Properties," *Nano Letters*, vol. 16, no. 11, pp. 264-269, Dec 2015. (impact factor: 13.59)

- JP5 **Z. Fan**, X. Y. Tao, G. Dharuman, L. X. Dong and X. D. Li, "Modeling and Simulation of An Ultrasensitive Electron Tunneling Position/Force Nanosensor," *RSC Adv*, DOI: 10.1039/C5RA23781E, Nov 2015. (impact factor: 3.84)
- JP6 X. Y. Tao\*, **Z. Fan**\*, B. J. Nelson, G. Dharuman, W. Zhang, L. X. Dong and X. D. Li, "Internal electron tunneling enabled ultrasensitive position/force peapod sensors," *Nano Letters*, vol. 15, no. 11, pp. 7281-7287, Nov 2015. (\* Equal contribution) (impact factor: 13.59)
- JP7 **Z. Fan**, X. Y. Tao, X. D. Fan, X. B. Zhang, and L. X. Dong, "Nanotube Fountain Pen: Towards 3D manufacturing of metallic nanostructures," *Carbon*, 2015, doi:10.1016/j.carbon.2015.01.043. (impact factor: 6.16)
- JP8 **Z. Fan**, X. Y. Tao, X. D. Fan, X. D. Li, and L. X. Dong, "Sliding probe methods for in situ nanorobotic characterization of individual nanostructures," *IEEE Transactions on Robotics*, 2015, doi: 10.1109/TRO.2014.236733. (impact factor: 2.65)
- JP9 **Z. Fan**, X. D. Fan, A. Li, and L. X. Dong, "In situ Forming, Characterization, and Transduction of Nanowire Memristors," *Nanoscale*, vol. 5, pp. 12310 - 12315, 2013. (impact factor: 6.74)
- JP10 J. Du, Y. C. Yang, **Z. Fan**, Y. Xia, X. J. Cheng, Y. P. Gan, H. Hang, L. X. Dong, X. D. Li W. K. Zhang, and X. Y. Tao, "Biotemplating fabrication of NbC nanowire arrays on the bamboo substrate with remarkable mechanical/electrical properties," *Journal of Alloys and Compounds*, vol. 560, pp. 142-146, 2013. (impact factor: 2.16)
- JP11 **Z. Fan**, X. Y. Tao, X. D. Cui, X. D. Fan, X. B. Zhang, and L. X. Dong, "Metal-filled carbon nanotube based Optical Nanoantennas: Bubbling, Reshaping, and in situ Characterization," *Nanoscale*, vol. 4, pp. 5673-5679, 2012. (impact factor: 6.74)
- JP12 F. B. Rao, H. Almumen, **Z. Fan**, W. Li, and L. X. Dong, "Inter-sheet-effect-inspired graphene sensors: Design, fabrication and characterization," *Nanotechnology*, vol. 23, art. no. 105501, 2012. (impact factor: 3.84)
- JP13 X. Y. Tao, J. Du, Y. P. Li, Y. C. Yang, **Z. Fan**, Y. P. Gan, H. Huang, W. K. Zhang, L. X. Dong, and X. D. Li, "TaC nanowire/activated carbon microfiber hybrid structures from bamboo fibers," *Advanced Energy Materials*, vol. 1, pp. 534-539, 2011. (impact factor: 14.38)
- JP14 **Z. Fan**, Q. X. Cao, Y. Yang, and C. Y. Li, "Automatically generation of topological map for mobile robot," *J. Huazhong Univ. of Sci. & Tech.*, vol. 36, Sup. 1, 2008.

## *Conference Proceedings*

- IC1 **Z. Fan**, M. Yu, X. Y. Tao, R. Shanmugam, X. Fan, W. Lai., and L. X. Dong, " *In situ* Investigation of Nanoelectrochemical Systems," in Proc. of the 14th IEEE Conf Nanotechnology (IEEE-NANO 2014), Aug. 18-21, 2014, Toronto, Canada.
- IC2 **Z. Fan**, M. Yu, G. Dharuman, X. Fan, and L. X. Dong, " Nanorobotic End-effectors: Design, Fabrication, and *in situ* Characterization," in Proc. of the 9th Annual IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS 2014), April. 13-16, 2014, Waikiki Beach, Hawaii, USA. **(Best student paper finalist)**
- IC3 **Z. Fan**, X. Fan, A. Li, and L. X. Dong, "Nanorobotic *in situ* characterization of Nanowire Memristors and “Memsensing”,” in Proc. of IEEE/RSJ 2013 International Conference on Intelligent Robots and Systems (IROS2013), Nov. 3-7, 2013, Tokyo, Japan.
- IC4 G. Dharuman, **Z. Fan**, and L. X. Dong, "An Inter-Segment Tunneling Nanoscale Force Sensor: Modeling and Simulation," in Proc. of the 13th IEEE Conf Nanotechnology (IEEE-NANO 2013), Aug. 5-8, 2013, Beijing, China.
- IC5 Z. K. Weng, L. X. Dong, M. Yu, F. B. Rao, **Z. Fan**, and Z. B. Wang, "Carbon Nanogears and Nanotori Via Combustion Flames," in Proc. of the 13th IEEE Conf Nanotechnology (IEEE-NANO 2013), Aug. 5-8, 2013, Beijing, China.
- IC6 **Z. Fan**, X. D. Fan, A. Li, and L. X. Dong, "Resistive Switching in Copper Oxide Nanowire-based Memristors," in Proc. of the 12th IEEE Conf Nanotechnology (IEEE-NANO 2012), Aug. 20-23, 2012, Bermingham, U. K.
- IC7 **Z. Fan**, X. Y. Tao, X. B. Zhang, and L. X. Dong, "Nanorobotic Mass Transport," in Proc. of the 12th IEEE Conf Nanotechnology (IEEE-NANO 2012), Aug. 20-23, 2012, Bermingham, U. K.
- IC8 **Z. Fan** and L. X. Dong, "Nanotube fountain pen," in 13th Robotics & remote Systems for Hazardous Environments (ANS EPRRSD), 2011, Knoxville, Tennessee.
- IC9 **Z. Fan**, X. Y. Tao, X. Li, and L. X. Dong, "Multipoint sliding probe methods for *in situ* electrical transport property characterization of individual nanostructures," in Proc. of IEEE/RSJ 2011 International Conference on Intelligent Robots and Systems (IROS2011), Oct. 7-12, 2011, pp. 1705-1710, San Francisco, California.

- IC10 F. B. Rao, H. Almumen, **Z. Fan**, W. Li, and L. X. Dong, "Towards Batch Fabrication of Graphene Sensors Based on Inter-layer Effects," in Proc.of the 1st 3M-NANO (International Conference on Manipulation, Measurement and Manufacturing on the Nanoscale), Aug.29-Sep. 2, 2011, Changchun, China.**(Best application paper award)**
- IC11 **Z. Fan**, X. Y. Tao, X. B. Zhang, and L. X. Dong, "Towards nanotube fountain pen," in Proc. of the 11th IEEE Conf Nanotechnology (IEEE-NANO 2011), Aug.15-19, 2011, pp. 596-599, Portland, Oregon. **(This paper has been highlighted by the local newspaper during IEEE-NANO 2011: Innovation you don't have to see to believe, Brandon Blakeley, The Oregonian, pp. B1-B2, August 16, 2011)**
- IC12 **Z. Fan**, X. Y. Tao, X. D. Cui, X. D. Fan, X. B. Zhang, and L. X. Dong, "Electromigration-based deposition enabled by nanorobotic manipulation inside a transmission electron microscope," in Proc. of the 2011 IEEE International Conference on Robotics and Automation (ICRA 2011), May. 9-13, 2011, pp. 2686-2691, Shanghai, China.
- IC13 F. B. Rao, **Z. Fan**, L. X. Dong, and W. Li, Molecular Nanosensors based on the Inter-sheet Tunneling Effect of a Bilayer Graphene, Proc. of 2010 IEEE Int'l Conf. on Nano/Molecular Medicine & Engineering (Nanomed2010), Hong Kong, Dec. 5-8, 2010.
- IC14 X. Cui, **Z. Fan**, X. Y. Tao, W. Zhang, D. Erni, X. Fan, X. Zhang, and L. X. Dong, "Sphere-on-pillar optical nano-antennas," in Proc. of the 2010 IEEE Nanotechnology Materials and Devices Conference (IEEE-NMDC2010), Aug.18-20, 2010, pp. 171-176, Monterey, California.
- IC15 **Z. Fan**, X. Y. Tao, Y. P. Li, Y. C. Yang, J. Du, W. K. Zhang, H. Huang, Y. P. Gan, X. D. Li, and L. X. Dong, "*In situ* electrical property characterization of individual nanostructures using a sliding probe inside a transmission electron microscope," in Proc. of the 2010 IEEE Nanotechnology Materials and Devices Conference (IEEE-NMDC2010), Aug.18-20, 2010, pp. 149-152, Monterey, California.
- IC16 **Z. Fan**, X. Y. Tao, X. D. Cui, X. D. Fan, X. B. Zhang, and L. X. Dong, "Shaping the nanostructures from electromigration-based deposition," in Proc. of the 2010 IEEE Nanotechnology Materials and Devices Conference (IEEE-NMDC2010), Aug.18-20, 2010, pp. 22-25, Monterey, California.
- IC17 **Z. Fan**, X. Y. Tao, X. D. Cui, X. D. Fan, and L. X. Dong, "Spheres on pillars: Nanobubbling based on attogram mass delivery from metal-filled nanotubes," in Proc. of

the 10th IEEE Conf Nanotechnology (IEEE-NANO 2010), Aug.18-20, 2010, pp. 649-654, Seoul, Korea.

## **PATENTS**

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PN1. Service robot autonomous navigation method based on deformable topological map, CN Patent CN 101619985 B, 2011

Author: **Z. Fan**, Q. X. Cao, Z. Liu, W. H. Luo.

PN2. Automatic tracking and navigation system of intelligent aid type walking robots, CN Patent CN101549498 B, 2010

Author: **Z. Fan**, Q. X. Cao, L. Zhang, W. H. Luo.

## **INVITED PAPERS AND TALKS**

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2013 – November, as invited by Prof. Masahiro Nakajima, a special talk is delivered to the Fukuda Laboratory in Nagoya University, Japan. The talk was given as “Special Lecture on the Micro-Nano Excellent Graduate School”.

2013 – Z. K. Weng, L. X. Dong, M. Yu, F. B. Rao, **Z. Fan**, and Z. B. Wang, Carbon Nanogears and Nanotori via Combustion Flames, Proc. of the 13th IEEE Conf. on Nanotechnology (IEEE-NANO 2013), Beijing, China, Aug. 5-9, 2013. (*Speaker*)

2011 – **Z. Fan** and L. X. Dong, "Nanotube fountain pen," in 13th Robotics & remote Systems for Hazardous Environments (ANS EPRRSD), 2011, Knoxville, Tennessee. (*Speaker*)

2011 – **Z. Fan**, X. Y. Tao, X. Li, and L. X. Dong, "Multipoint sliding probe methods for *in situ* electrical transport property characterization of individual nanostructures," in Proc. of IEEE/RSJ 2011 International Conference on Intelligent Robots and Systems (IROS2011), Oct. 7-12, 2011, pp. 1705-1710, San Francisco, California. (*Speaker*)

## **TEACHING**

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**2011 – 2013: NSC-816 (MSU), *Advanced Physical Science Transmission Electron Microscopy***

- ▶ NSC-816 is a high-level course for the graduate student in introducing the advanced analytical electron microscopy techniques.

- ▶ I paid more attention on the student-centered discussion and collaboration during the class as well as the independent tasks. I have also applied flipped classroom teaching mode during the class.

**2009 – 2011: NSC-815 (MSU), *Physical Science Transmission Electron Microscopy***

- ▶ NSC-815 is an introduction course for the undergraduate students in introducing basic operation mechanisms of electron microscope.
- ▶ I have used the heuristic teaching strategy during the class. By using approaches including quiz, class assignment, and small-group discussions, I raised student's interest in topics and spurring them further investigate this area.

***Outreach Activities:***

2013 – Summer, Research Experiences for Teachers (RET) program, assistant the high school teacher to gain more research experience.

2012 – Summer, Research Experiences for Teachers (RET) program, assistant the high school teacher to gain more research experience.

**PROFESSIONAL SERVICE**

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***Editorship:***

2017 – June, IEEE-NANO 2017, Associated Editor of the Topic of Nanomaterials

2014 – present, *Nano-Micro Letters*, Springer, United States

2014 – present, *Journal of Nano Research*, Trans Tech Publications (TTP), Switzerland

***International conference session chair:***

Session of Nanomaterials - IEEE-NANO 2017

Session ThC3- IEEE-NANO 2013

***International conference committee member:***

IEEE-NANO 2017

IEEE-NANO 2013