

Dr. Bo Shen

Department of Materials Science and Engineering, City University of Hong Kong,
Tat Chee Avenue, Kowloon, HK SAR, China

Professional Experience

Presidential Assistant Professor, Department of MSE, City University of Hong Kong Starting from 2025.1

Postdoctoral Fellow, International Institute for Nanotechnology, Northwestern University, U.S. 2019 – 2024

Advisor: Prof. Chad A. Mirkin

Education

Ph.D. in Chemistry, Brown University, U.S. 2013 – 2018

Advisor: Prof. Shouheng Sun

B.S. in Chemistry, Nankai University, Tianjin, China 2009 – 2013

Advisor: Prof. Bin Zhao

Honors and Awards

- 2021 International Institute for Nanotechnology (IIN) Postdoctoral Fellowship
- 2021 International Institute for Nanotechnology (IIN) Outstanding Research Award
- 2017 and 2018 William R. Potter Chemistry Graduate Student Conference Travel Award, Brown University
- 2015 Dwight A. Sweigart Travel Award, Brown University

Patent

“High-index facet nanocatalysts for clean energy applications” Mirkin, C. A.; Shen, B., Provisional application: NU2023-109-01

Publications (# denotes equal contribution)

First-author publications:

[1] Ye, Z.[#]; **Shen, B.[#]**; Kang, D.; Shen, J.; Huang, J.; Wang, Z.; Huang, L.; Wolverson, C.; Mirkin, C. A. “A data-driven approach for the guided regulation of exposed facets in nanoparticles” *Nat. Synth.* **2024**, *3*, 922–929.

[2] Ye, Z.[#]; **Shen, B.[#]**; Kang, D.; Huang, J.; Wang, Z.; Wahl, C.; Shin, D.; Huang, L.; Shen, J.; Wolverson, C.; Mirkin, C. A. “Using surface composition and energy to control the formation of either tetrahedral or hexoctahedral high index facet nanostructures” *J. Am. Chem. Soc.*, **2024**, *146*, 13519-13526.

[3] **Shen, B.[#]**; Huang, L.[#]; Shen, J.; Zheng, C. Y.; Wolverson, C.; Mirkin, C. A. “Morphology engineering in multi-component hollow metal chalcogenide nanoparticles” *ACS Nano.* **2023**, *17*, 4642-4649.

[4] Koo, K.[#]; **Shen, B.[#]**; Baik, S. I.; Mao, Z.; Smeets, P.; Cheuk, I.; He, K.; Reis, R.; Huang, L.; Ye, Z.; Hu, X.; Mirkin, C. A.; Dravid, V. P. “Formation mechanism of high-index faceted Pt-Bi alloy nanoparticles by evaporation-induced growth from metal salts” *Nat. Commun.* **2023**, *14*, 3790. (Selected as **Editors’ Highlights**)

[5] Huang, L.[#]; **Shen, B.[#]**; Lin, H.; Shen, J.; Jibril, L.; Zheng, C. Y.; Wolverson, C.; Mirkin, C. A. “Regioselective deposition of metals on seeds within a polymer matrix” *J. Am. Chem. Soc.*, **2022**, *144*, 4792-4798.

[6] **Shen, B.[#]**; Huang, L.[#]; Shen, J.; He, K.; Zheng, C. Y.; Dravid, V. P. Wolverson, C.; Mirkin, C. A. “Crystal structure engineering in multimetallic high-index facet nanocatalysts” *PNAS*, **2021**, *118*, e2105722118.

[7] **Shen, B.[#]**; Huang, L.[#]; Shen, J.; Meng, L.; Kluender, E. J.; Wolverson, C.; Tian, B.; Mirkin, C. A. “Synthesis of metal-capped nanowires from heterodimer nanoparticle catalysts” *J. Am. Chem. Soc.*, **2020**, *142*, 18324-18329.

[8] **Shen, B.**; Sun, S “Chemical synthesis of magnetic nanoparticles for permanent magnet applications” *Chem. Eur. J.* **2020**, *26*, 6757-6766. (**Invited Review**)

[9] **Shen, B.**; Yu, C.; Baker, A. A.; McCall, S. K.; Yu, Y.; Su, D.; Yin, Z.; Liu, H.; Li, J.; Sun, S. “Chemical synthesis of magnetically hard and strong rare-earth metal-based nanoparticles” *Angew. Chem. Int. Ed.* **2019**, *58*, 602-606. (Selected as “**Hot Paper**”)

[10] **Shen, B.**; Yu, C.; Su, D.; Yin, Z.; Li, J.; Xi, Z.; Sun, S. “A novel approach to anisotropic SmCo₅ nanomagnets” *Nanoscale*, **2018**, *10*, 8735-8740.

[11] **Shen, B.**; Mendoza-Garcia, A.; Baker, S. E.; McCall, S. K.; Yu, C.; Wu, L.; Sun, S. “Stabilizing Fe nanoparticles in the SmCo₅ matrix” *Nano Lett.*, **2017**, *17*, 5695-5698.

[12] **Shen, B.**; Shi, P. F.; Hou, Y. L.; Wan, F. F.; Gao, D. L.; Zhao, B. “Structural diversity and magnetic properties of five copper-organic frameworks containing one-, two-, and three-types of organic ligands” *Dalton Trans.*, **2013**, *42*, 3455-3463.

Co-author publications:

[13] Huang, L.; Zheng, C. Y.; **Shen, B.**; Mirkin, C. A. “Multimetallic high-index facet nanoparticles as electrocatalysts for fuel cells” *Adv. Mater.* **2020**, 2002849.

[14] Huang, L.; Lin, H.; Zheng, C. Y.; Kluender, E. J.; Golnabi, R.; **Shen, B.**; Mirkin, C. A. “Multimetallic high-index faceted heterostructured nanoparticles” *J. Am. Chem. Soc.*, **2020**, *142*, 4570-4575.

[15] Liu, H.; Liu, X.; Yang, W.; Shen, M.; Geng, S.; Yu, C.; **Shen, B.**; Yu, Y. “Photocatalytic dehydrogenation of formic acid promoted by a superior PdAg@g-C₃N₄ Mott–Schottky heterojunction”. *J. Mater. Chem. A.* **2019**, *7*, 2022-2026.

[16] Li, J.; Sharma, S.; Liu, X.; Pan, Y. T.; Spendelow, J. S.; Chi, M.; Zhang, P.; Xi, Z.; Lin, H.; Yin, Z.; **Shen, B.**; Muzzio, M.; Yu, C.; Kim, Y. S.; Peterson, A. A.; Sun, S. “Stabilized Co in intermetallic L1₀-CoPt nanoparticles advancing fuel cell catalysis” *Joule*, **2019**, *3*, 124-135.

[17] Yu, C.; Guo, X.; **Shen, B.**; Xi, Z.; Li, Q.; Yin, Z.; Liu, H.; Shen, M.; Li, J.; Seto, C. T.; Sun, S. “One-pot formic acid dehydrogenation and synthesis of benzene-fused heterocycles over reusable AgPd/WO_{2.72} nanocatalyst” *J. Mater. Chem. A.* **2018**, *6*, 23766-23772.

[18] Li, J.; Xi, Z.; Spendelow, J. S.; Duchesne, P. N.; Su, D.; Li, Q.; Yu, C.; Yin, Z.; **Shen, B.**; Kim, Y. S.; Zhang, P.; Sun, S. “Ordered intermetallic core/shell FePt/Pt nanoparticle with atomic layers of Pt as highly active and durable oxygen reduction catalyst utilized for fuel cells” *J. Am. Chem. Soc.*, **2018**, *140*, 2926-2932.

[19] Yu, C.; Guo, X.; Shen, M.; **Shen, B.**; Muzzio, M.; Yin, Z.; Li, Q.; Xi, Z.; Li, J.; Seto, C. T.; Sun, S. “Maximizing the catalytic activity of nanoparticles through monolayer assembly on nitrogen-doped graphene” *Angew. Chem. Int. Ed.* **2018**, *57*, 451-455.

[20] Yu, C.; Guo, X.; Xi, Z.; Muzzio, M.; Yin, Z.; **Shen, B.**; Li, J.; Seto, C. T.; Sun, S. “AgPd nanoparticles deposited on WO_{2.72} nanorods as an efficient catalyst for one-pot conversion of nitrophenol/nitroacetophenone into benzoxazole/quinazoline” *J. Am. Chem. Soc.* **2017**, *139*, 5712-5715.

[21] Li, Q.; Fu, J.; Zhu, W.; Chen, Z.; **Shen, B.**; Wu, L.; Wang, T.; Xi, Z.; Lu, G.; Zhu, J.; Sun, S. “Tuning Sn-catalysis for electrochemical reduction of CO₂ to CO via the core/shell Cu/SnO₂ structure” *J. Am. Chem. Soc.* **2017**, *139*, 4290-4293.

[22] Jiang, G.; Zhu, H.; Zhang, X.; **Shen, B.**; Wu, L.; Zhang, S.; Lu, G.; Wu, Z.; Sun, S. “Core/shell face-centered tetragonal FePd/Pd nanoparticles as an efficient non-Pt catalyst for the oxygen reduction reaction” *ACS Nano*, **2015**, *9*, 11014-11022.

[23] Wu, L.; **Shen, B.**; Sun, S. “Synthesis and assembly of barium-doped iron oxide nanoparticles and nanomagnets” *Nanoscale*, **2015**, *7*, 16165-16169.

[24] Wu, L.; Li, Q.; Wu, C. H.; Zhu, H.; Mendoza-Garcia, A.; **Shen, B.**; Guo, J.; Sun, S. “Stable cobalt nanoparticles and their monolayer array as an efficient electrocatalyst for oxygen evolution reaction” *J. Am. Chem. Soc.*, **2015**, *137*, 7071-7074.

[25] Hou, Y. L.; Xiong, G.; **Shen, B.**; Zhao, B.; Chen, Z.; Cui, J. Z. “Structures, luminescent and magnetic properties of six lanthanide–organic frameworks: observation of slow magnetic relaxation behavior in the Dy^{III} compound” *Dalton Trans.*, **2013**, *42*, 3587-3596.

[26] Shi, P. F.; Chen, Z.; Xiong, G.; **Shen, B.**; Sun, J. Z.; Cheng, P.; Zhao, B. “Structures, luminescence, and magnetic properties of several three-dimensional lanthanide–organic frameworks comprising 4-carboxyphenoxy acetic acid” *Cryst. Growth Des.*, **2012**, *12*, 5203–5210.

Presentations

[1] “A data-driven approach to accelerate the discovery of high-index facet nanoparticles” MRS Fall **2023**, Boston, MA.

[2] “Synthesis of metal-capped semiconductor nanowires” MRS Fall **2022**, Boston, MA.

[3] “Crystal structure engineering in multimetallic high-index facet nanocatalysts” ACS Fall **2022**, Chicago, IL.

[4] “A general way to synthesize Sm-based nanomagnet” ACS Fall **2018**, Boston, MA.

[5] “A self-assembly method to fabricate anisotropic SmCo₅ nanoplate with alignment” ACS Spring **2018**, New Orleans, LA.

[6] “A facile way to synthesize SmCo₅-Fe nanocomposite” ACS Spring **2017**, San Francisco, CA.