# Wenxiang Chen

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## Education

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| 2017 – present | Postdoctoral researcher in Materials Science and Engineering<br>University of Illinois Urbana-Champaign (UIUC)<br>Advisor: Prof. Qian Chen |
| 2011 – 2017 | Ph.D. in Electrical and Systems Engineering, University of Pennsylvania<br>Thesis: Novel plasmonic materials, metasurfaces and their application in light manipulation and environmental sensing<br>Advisor: Prof. Cherie R. Kagan |
| 2007 – 2011 | Bachelor of Science in Applied Physics, University of Science and Technology of China |
| 2010 | Summer visiting scholar in Physics**,** Pohang University of Science and Technology, Korea<br>Advisor: Prof. Dong Eon Kim |

## Publications

### Peer-reviewed journals

1. W. Chen, X. Zhan, R. Yuan, S. Pidaparthy, A. X. B. Yong, H. An, Z. Tang, K. Yin, A. Patra, H. Jeong, C. Zhang, K. Ta, Z. W. Riedel, R. M. Stephens, D. P. Shoemaker, H. Yang, A. A. Gewirth, P. V. Braun, E. Ertekin, J.-M. Zuo, Q. Chen, "Formation and impact of nanoscopic oriented phase domains in electrochemical crystalline electrodes", ***Nat. Mater.*** DOI: 10.1038/s41563-022-01381-4 (2022)
   ◆ Click here for the news report by Illinois News Bureau
2. Z. Lvu, L. Yao, W. Chen, F. C. Kalutantirige, Q. Chen, "Electron microscopy studies of anisotropic soft nanomaterials", ***Chem. Rev****. accepted* (2022)
3. S. Zhou, J. Li, J. Lu, H. Liu, J.-Y. Kim, A. Kim, L. Yao, C. Liu, C. Qian, Z. Hood, X. Lin, W. Chen, T. Gage, I. Arslan, A. Travesset, K. Sun, N. Kotov, Q. Chen, "Chiral assemblies of pinwheel superlattices on substrates", ***Nature*** 612, 259–265 (2022)
4. W. Chen, Z. Tang, Q. Chen, "Engineering particle size for multivalent ion intercalation: implications for ion battery systems", ***ACS Appl. Nano Mater.*** 5, 5983–5992 (2022)
5. Z. Tang, W. Chen, Z. Lyu, Q. Chen, "Size-dependent reaction mechanism of λ-$MnO_2$ particles as cathodes in aqueous zinc-ion batteries", ***Energy Mater. Adv.*** 2022, 9765710 (2022)
6. H. An, J. W. Smith, B. Ji, S. Cotty, S. Zhou, L. Yao, F. C. Kalutantirige, W. Chen, Z. Ou, X. Su, J. Feng, Q. Chen, "Mechanism and performance relevance of nanomorphogenesis in polyamide films revealed by quantitative 3D imaging and machine learning", ***Sci. Adv.*** 8, eabk1888 (2022)
7. G. Yan, G. Kim, R. Yuan, E. Hoenig, F. Shi, W. Chen, Y. Han, Q. Chen, J.-M. Zuo, W. Chen, C. Liu, "The role of solid solutions in iron phosphate-based electrodes for selective electrochemical lithium extraction", ***Nat. Commun.*** 13, 4579 (2022)
8. C. Zhang, X. Zhan, T. Al-Zoubi, Y. Ma, P.-C. Shih, F. Wang, W. Chen, S. Pidaparthy, R. M. Stephens, Q. Chen, J.-M. Zuo, H. Yang, "Electrochemical generation of birnessite $MnO_2$ nanoflowers for intercalation of $Mg^{2+}$ ions", ***Nano Energy*** 102, 107696 (2022)
9. C. Liu, Z. Ou, F. Guo, B. Luo, W. Chen, L. Qi, Q. Chen, "Colloid-atom duality in the assembly dynamics of concave gold nanoarrows", ***J. Am. Chem. Soc.*** 142, 11669–11673 (2020)

10. W. Chen, X. Zhan, B. Luo, Z. Ou, P.-C. Shih, L. Yao, S. Pidaparthy, A. Patra, H. An, P. V. Braun, R. M. Stephens, H. Yang, J.-M. Zuo, Q. Chen, "Effects of particle size on $Mg^{2+}$ ion intercalation into λ-$MnO_2$ cathode materials", ***Nano Lett.*** 19, 4712–4720 (2019)
11. H. An, J. W. Smith, W. Chen, Z. Ou, Q. Chen, "Charting the quantitative relationship between two-dimensional morphology parameters of polyamide membranes and synthesis conditions", ***Mol. Syst. Des. Eng.*** 5, 102–109, (2020)
12. X. Song, J. W. Smith, J. Kim, N. J. Zaluzec, W. Chen, H. An, J. M. Dennison, D. G. Cahill, M. A. Kulzick, Q. Chen, "Unraveling the morphology–function relationships of polyamide membranes using quantitative electron tomography", ***ACS Appl. Mater. Interfaces*** 11, 8517–8526 (2019)
13. W. Chen, J. Guo, Q. Zhao, P. Gopalan, A. T. Fafarman, A. Keller, M. Zhang, Y. Wu, C. B. Murray, C. R. Kagan, "Designing strong optical absorbers *via* continuous tuning of interparticle interaction in colloidal gold nanocrystal assemblies", ***ACS Nano*** 13, 7493–7501 (2019)
14. W. Chen, W. Liu, Y. Jiang, M. Zhang, N. Song, N. J. Greybush, J. Guo, A. K. Estep, K. T. Turner, R. Agarwal, C. R. Kagan, "Ultrasensitive, mechanically responsive optical metasurfaces via strain amplification", ***ACS Nano*** 12, 10683–10692 (2018)
15. W. Chen, G. Wu, M. Zhang, N. J. Greybush, J. P. Howard-Jennings, N. Song, F. S. Stinner, S. Yang, C. R. Kagan, "Angle-independent optical moisture sensors based on hydrogel-coated plasmonic lattice arrays", ***ACS Appl. Nano Mater.*** 1, 1430–1437 (2018)
16. M. Zhang, V. Pacheco-Peña, Y. Yu, W. Chen, N. J. Greybush, A. Stein, N. Engheta, C. B. Murray, C. R. Kagan, "Nanoimprinted chiral plasmonic substrates with three-dimensional nanostructures", ***Nano Lett.*** 18, 7389–7394 (2018)
17. M. Zhang, J. Guo, Y. Yu, Y. Wu, H. Yun, D. Jishkariani, W. Chen, N. J. Greybush, C. Kübel, A. Stein, C. B. Murray, C. R. Kagan, "3D nanofabrication via chemo-mechanical transformation of nanocrystal/bulk heterostructures", ***Adv. Mater.*** 30, 1800233 (2018)
18. Q. Zhao, T. Zhao, J. Guo, W. Chen, M. Zhang, C. R. Kagan, "The effect of dielectric environment on doping efficiency in colloidal PbSe nanostructures", ***ACS Nano*** 12, 1313–1320 (2018)
19. M. Zhang, D. J. Magangnosc, I. Liberal, Y. Yu, H. Yun, H. Yang, Y. Wu, J. Guo, W. Chen, Y. J. Shin, A. Stein, J. M. Kikkawa, N. Engheta, D. S. Gianola, C. B. Murray, C. R. Kagan, "High-strength magnetically-switchable plasmonic nanorods assembled from a binary nanocrystal mixture", ***Nat. Nanotechnol.*** 12, 228–232 (2017)
20. W. Chen, M. Tymchenko, P. Gopalan, X. Ye, Y. Wu, M. Zhang, C. B. Murray, A. Alu, C. R. Kagan, **"**Large-area nanoimprinted colloidal Au nanocrystal-based nanoantennas for ultrathin polarizing plasmonic metasurfaces", ***Nano Lett.*** 15, 5254–5260 (2015)
21. W. Chen, G. Chen, D. E. Kim, "Two-color field for the generation of an isolated attosecond pulse in water-window region", ***Opt. Express*** 19, 20610–20615 (2011)

**Book Chapter (Invited)**

1. S. Zhou, W. Chen, Q. Chen, invited (2020), in the book "Self-Assembly of Plasmonic Nanostructures" by World Scientific Publishing Company

**Patent**

1. Ultra-sensitive, mechanically-responsive optical metasurfaces via strain amplification (US 2021/0088392 A1, awarded 03/25/2021). Inventors: C. R. Kagan, K. T. Turner, W. Chen, Y. Jiang

**Conference Papers**

1. W. Chen, X. Zhan, R. Yuan, S. Pidaparthy, Z. Tang, J.-M. Zuo, Q. Chen, "4D-STEM mapping of nanoscale structural ordering in cathode materials", ***Microsc. Microanal.*** 28, 2608–2609 (2022)
2. O. Lin, C. Liu, W. Chen, J.-M. Zuo, Q. Chen, "Structural characterization of gold nanoparticles using

liquid-phase 4D-STEM", ***Microsc. Microanal.*** 28, 1860–1861 (2022)

3. X. Zhan, J.-M. Zuo, W. Chen, Q. Chen, "Determination of Mn valences in $Li_{1-x}Mg_xMn_2O_4$ using monochromated EELS in an aberration-corrected STEM", ***Microsc. Microanal.*** 25, 658–659, (2019)
4. X. Zhan, R. Yuan, W. Chen, Q. Chen, J.-M. Zuo, "Determination of crystallinity in $Li_{1-x}Mg_xMn_2O_4$ nanocrystals based on diffraction patterns correlation analysis and strain mapping", ***Microsc. Microanal.*** 25, 1972–1973, (2019)

**Manuscripts in preparation**

1. W. Chen, S. Pidaparthy, X. Zhan, R. Yuan, R. Zhang, C. Qian, E. S. Thornburg, H. An, C. Zhang, L. Yao, Z. Tang, Z. Lyu, A. Patra, H. Yang, P. V. Braun, A. A. Gewirth, J.-M. Zuo, Q. Chen, "Electrolyte-dependent phase transformation from diffusion limitation to solid solutions in crystalline cathode materials", *to be submitted*
2. W. Chen, E. S. Thornburg, S. Pidaparthy, X. Zhan, C.-Y. Hwang, A. Patra, R. Yuan, H. An, P. V. Braun, J.-M. Zuo, A. A. Gewirth, Q. Chen, "Nanoscale imaging of order-disorder transitions in $LiNi_{0.5}Mn_{1.5}O_4$ cathode particles", *to be submitted*
3. W. Chen, S. Pidaparthy, R. Yuan, X. Zhan, H. An, E. S. Thornburg, Z. Tang, A. A. Gewirth, P. V. Braun, J.-M. Zuo, Q. Chen, "Atomic-scale defects in crystalline cathode materials revealed from cepstral scanning transmission electron microscopy", *to be submitted*

## Honors and Awards

2020 Selected speaker for North American Materials Colloquium Series
- The only student/postdoc selected from Materials Science and Engineering, UIUC

2017 The S. J. Stein Prize, School of Engineering and Applied Science, University of Pennsylvania
- Awarded to one Ph.D. or M.S.E. degree recipient for superior achievement in the field of new or unique materials or applications for materials in electronics.

## Presentations

**Invited Talk**

2020 North American Materials Colloquium Series
- "Strain-induced electrochemical inhomogeneity in cathode nanoparticles revealed at atomic level"

**Contributed Talks**

2022 Microscopy & Microanalysis meeting, Portland, OR (August 4)
"Electrolyte-dependent structural heterogeneity and its atomic origin in primary cathode nanoparticles"

2021 ACS Colloid and Surface Science Symposium, virtual (June 14)
"Electrolyte-dependent structural heterogeneity and its atomic origin in primary cathode nanoparticles"

2021 MRS Spring Meeting & Exhibit, virtual (April 19)
"Electrolyte-dependent phase heterogeneity and its atomic origin within primary cathode nanoparticles"

2020 MRS Spring/Fall Meeting & Exhibit, virtual (November 30)
"Effects of nanoparticle size and solvent molecule on $Mg^{2+}$ insertion into the cathode materials"

2020 MRS Spring Meeting & Exhibit, Phoenix, AZ (April 25)
"Effects of nanoparticle size on $Mg^{2+}$ intercalation into the cathode materials"

## Review Experience (Journal Referee)

*Adv. Mater., Nano Lett., ACS Nano, ACS Photonics, ACS Appl. Mater. Interfaces*

## Teaching and Mentoring

### Research Mentor

2017 – present Materials Science and Engineering, UIUC

- Mentor three Ph.D. students (Zhichu Tang, Chu-Yun Hwang, and Lehan Yao). We published three peer-reviewed papers together and have three more papers to submit.
- Lehan Yao received Warren Yee Memorial Fellowship, College of Engineering, UIUC (2021)

2012 – 2017 Electrical and Systems Engineering, University of Pennsylvania

- Mentored two graduate students (Prashanth Gopalan and Naixin Song)
- Mentees obtained M.S. degrees and then got admission to Ph.D. programs at the University of Utah and University of Pennsylvania, respectively.

### Teaching experience

2012 – 2013 Electrical and Systems Engineering, University of Pennsylvania

- Electromagnetics and Optics Theory (ESE 510)
- Semiconductor Device Physics and Technology (ESE 521)
- Nanoscale Science and Engineering (ESE 525)

## Outreach activities

### Services to broaden diversity and inclusions

2023 Lunch (including short presentation) with speakers of Distinguished Lectures, Department of Chemistry, UIUC

2019 Materials Science and Engineering, UIUC

- Mentor one high school student (Autumn Kennedy) from Rantoul Township High School (Rantoul, IL) for six weeks through the World Wide Youth in Science and Engineering Program, UIUC:
  We built rechargeable ion batteries and performing electrochemical tests in the lab.

2019 Materials Science and Engineering, UIUC

- Successful completion of the Illinois Mentoring Certificate Program

2017 Electrical and Systems Engineering, University of Pennsylvania

- Philadelphia Science Festival: presented demonstrations on "shape-memory alloy" to the general public visitors

2016 & 2017 Electrical and Systems Engineering, University of Pennsylvania

- "Girls in Engineering, Math, and Science Camp" (known as Penn GEMS): Presented demonstrations on "light propagation" and guided high-school students with hands-on activities

2016 Electrical and Systems Engineering, University of Pennsylvania

- Mentored one undergraduate (Jordan P Howard-Jennings) from Harvey Mudd College (Claremont, CA) through Summer Undergraduate Fellowship in Sensor

Technologies (SUNFEST) program, University of Pennsylvania. We conducted experiments, analyzed data, and published a paper together.

**Academic service**

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| 2023 | Panel of students/postdocs to meet with the faculty candidates, Department of Chemistry, UIUC (January 3) |
| 2022 | Microscopy & Microanalysis, Portland, OR (July 31–August 4)<br>Session chair for "P05: In situ TEM characterization of dynamic processes during materials synthesis and processing" |

## References


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