Stanford

Zihao Ou

Physical Science Research Scientist

Materials Science and Engineering

Bio

BIO

My research interests have been focusing on how individual building blocks come together resulting in complex functions which are hard to predict, if possible, from the individual identities. Similar to a digital screen displaying a movie, the complicated pattern and story can hardly be interpreted from the dynamic traces of a single pixel. Specifically, I have been studying the general topic of self-assembly and non-equilibrium behaviors in soft matter systems, using both experimental and simulation tools.

I obtained my B.S. degree in physics from University of Science and Technology of China (USTC) in 2015. In my undergraduate research, I tried to use computer simulation to study multiple systems in Prof. Zhonghuai Hou's group, such as the Viscek model for self-propelled particles. In 2014, I visited Oxford University to study the phase behaviors of active nematics using Lattice-Boltzmann method in Prof. Julia M. Yeomans' group. In 2020, I obtained my Ph.D. degree in Materials Science and Engineering at University of Illinois at Urbana-Champaign (UIUC) under the supervision of Prof. Qian Chen. During my Ph.D. research, we illustrated the nonclassical crystallization pathway of nanoparticles (Nat. Mater., 19, 450–455, 2020) and supracrystal growth kinetics (Nat. Commun., 11, 4555, 2020) using liquid-phase TEM. I also studied other nonequilibrium behaviors in novel colloidal systems, such as shape transformation of metal-organic framework crystals during chemical etching (ACS Appl. Mater. Interfaces, 10, 48, 40990–40995, 2018), application of ferromagnetic colloids in inductor design (Science Adv., 6, 3, eaay4508, 2020) and electron transport in redox-active colloids.

In August 2020, I joined Prof. Guosong Hong's group at the materials science and engineering department at Stanford University to develop novel nanomaterials that can interact with neurons at the subcellular level. Armed with the knowledge of nanotechnology and theoretical modeling, we are extending the tools that can be used to investigate the challenging questions in neuroscience.

ACADEMIC APPOINTMENTS

- Phys Sci Res Assoc, Materials Science and Engineering

HONORS AND AWARDS

- Wu Tsai Neurosciences Institute Interdisciplinary Scholar Award, Stanford University (2022)
- Racheff-Intel Award, UIUC (2020)
- Conference Travel Awards for Grdaduate Students, UIUC (2019)
- Dow Best Presentation Award for Soft Materials Seminar, UIUC (2019)
- Outstanding Teaching Assistant Award, USTC (2015)

PROFESSIONAL EDUCATION

- Ph.D., University of Illinois at Urbana-Champaign , Materials Science and Engineering (2020)
- B.S., University of Science and Technology of China , Physics (2015)

PATENTS

- Xiuling Li,Wen Huang,Zhendong Yang,Mark D. Kraman,Jimmy Ni,Zihao Ou,Qian Chen,J. Gary Eden. "United States Patent 16,434,524 Rolled-up electromagnetic component for on-chip applications and method of making a rolled-up electromagnetic component", Jun 8, 2021

Publications

PUBLICATIONS

- **Isolation and Anticancer Progression Evaluation of the Chemical Constituents from Bridelia balansae Tutcher.** *Molecules (Basel, Switzerland)*
  Zhao, L., Xie, W., Du, Y., Xia, Y., Liu, K., Ku, C. F., Ou, Z., Wang, M., Zhang, H.
  2023; 28 (16)
- **Understanding ZIF particle chemical etching dynamics and morphology manipulation: in situ liquid phase electron microscopy and 3D electron tomography application.** *Nanoscale*
  Chang, Q., Yang, D., Zhang, X., Ou, Z., Kim, J., Liang, T., Chen, J., Cheng, S., Cheng, L., Ge, B., Ang, E. H., Xiang, H., Li, et al
  2023
- **Quantifying the Morphology Evolution of Lithium Battery Materials Using Operando Electron Microscopy** *ACS MATERIALS LETTERS*
  Chang, Q., Ng, Y., Yang, D., Chen, J., Liang, T., Chen, S., Zhang, X., Ou, Z., Kim, J., Ang, E., Xiang, H., Song, X.
  2023; 5 (6): 1506-1526
- **Unravelling crystal growth of nanoparticles** *NATURE NANOTECHNOLOGY*
  Luo, B., Wang, Z., Curk, T., Watson, G., Liu, C., Kim, A., Ou, Z., Luijten, E., Chen, Q.
  2023
- **Direct Imaging of the Kinetic Crystallization Pathway: Simulation and Liquid-Phase Transmission Electron Microscopy Observations.** *Materials (Basel, Switzerland)*
  Xu, Z., Ou, Z.
  2023; 16 (5)
- **Palette of Rechargeable Mechanoluminescent Fluids Produced by a Biomineral-Inspired Suppressed Dissolution Approach.** *Journal of the American Chemical Society*
  Yang, F., Wu, X., Cui, H., Jiang, S., Ou, Z., Cai, S., Hong, G.
  2022
- **Shedding light on neurons: optical approaches for neuromodulation.** *National science review*
  Jiang, S., Wu, X., Rommelfanger, N. J., Ou, Z., Hong, G.
  2022; 9 (10): nwac007
- **High-Resolution Electron Tomography of Ultrathin Boerdijk-Coxeter-Bernal Nanowire Enabled by Superthin Metal Surface Coating.** *Small (Weinheim an der Bergstrasse, Germany)*
  Song, X., Zhang, X., Chang, Q., Yao, X., Li, M., Zhang, R., Liu, X., Song, C., Ng, Y. X., Ang, E. H., Ou, Z.
  2022: e2203310
- **A biomineral-inspired approach of synthesizing colloidal persistent phosphors as a multicolor, intravital light source.** *Science advances*
  Yang, F., Wu, X., Cui, H., Ou, Z., Jiang, S., Cai, S., Zhou, Q., Wong, B. G., Huang, H., Hong, G.
  2022; 8 (30): eabo6743
- **Pristine carbon nanotubes are efficient absorbers at radio frequencies.** *Nanotechnology*
  Rommelfanger, N. J., Brinson, K., Bailey, J. E., Bancroft, A. M., Ou, Z., Hong, G.
  2022
- **Mechanism and performance relevance of nanomorphogenesis in polyamide films revealed by quantitative 3D imaging and machine learning.** *Science advances*
  An, H., Smith, J. W., Ji, B., Cotty, S., Zhou, S., Yao, L., Kalutantirige, F. C., Chen, W., Ou, Z., Su, X., Feng, J., Chen, Q.

2022; 8 (8): eabk1888

- **Shedding light on neurons: optical approaches for neuromodulation** *NATIONAL SCIENCE REVIEW*
  Jiang, S., Wu, X., Rommelfanger, N. J., Ou, Z., Hong, G.
  2022
- **Differential Heating of Metal Nanostructures at Radio Frequencies** *PHYSICAL REVIEW APPLIED*
  Rommelfanger, N. J., Ou, Z., Keck, C. C., Hong, G.
  2021; 15 (5)
- **Differential heating of metal nanostructures at radio frequencies.** *Physical review applied*
  Rommelfanger, N. J., Ou, Z., Keck, C. H., Hong, G.
  2021; 15 (5)
- **Nanoscopic morphological effect on the optical properties of polymer-grafted gold polyhedra.** *Nanoscale advances*
  Lee, J., Bae, C., Ou, Z., Park, S., Kim, J., Kim, J.
  2021; 3 (7): 1927-1933
- **Revealing Structure Properties of ZIF-8 Particles Prepared by Wet Chemical Etching via 3D Electron Tomography** *ACS Materials Letters*
  Song, X., Ou, Z., Hu, X., Zhang, X., Li, M., Wen, L., Li, M.
  2021; 3: 171–178
- **Direct imaging on the deformation and sintering of polymeric particles at the nanoscale by liquid-phase TEM** *Microscopy and Microanalysis*
  Liu, C., Ou, Z., Chen, Q.
  2021; 27 (S1): 2630-2632
- **Bioinspired nanoantennas for opsin sensitization in optogenetic applications: a theoretical investigation** *Multifunctional Materials*
  Keck, C., Rommelfanger, N., Ou, Z., Hong, G.
  2021
- **Controlling the anisotropic surface wetting of metal nanoparticles by a competitive ligand packing strategy: Implications for encapsulation** *ACS Applied Nano Materials*
  Song, X., Zhang, X., Ou, Z., Zhang, Y., Li, M.
  2021
- **Nanoscopic morphological effect on the optical properties of polymer-grafted gold polyhedra** *Nanoscale Advances*
  Li, J., Bae, C., Ou, Z., Park, S., Kim, J., Kim, J.
  2021
- **Machine Learning to Reveal Nanoparticle Dynamics from Liquid-Phase TEM Videos.** *ACS central science*
  Yao, L., Ou, Z., Luo, B., Xu, C., Chen, Q.
  2020; 6 (8): 1421-1430
- **"Colloid-Atom Duality" in the Assembly Dynamics of Concave Gold Nanoarrows.** *Journal of the American Chemical Society*
  Liu, C., Ou, Z., Guo, F., Luo, B., Chen, W., Qi, L., Chen, Q.
  2020; 142 (27): 11669-11673
- **Kinetic pathways of crystallization at the nanoscale** *NATURE MATERIALS*
  Ou, Z., Wang, Z., Luo, B., Luijten, E., Chen, Q.
  2020; 19 (4): 450-+
- **Monolithic mtesla-level magnetic induction by self-rolled-up membrane technology.** *Science advances*
  Huang, W., Yang, Z., Kraman, M. D., Wang, Q., Ou, Z., Rojo, M. M., Yalamarthy, A. S., Chen, V., Lian, F., Ni, J. H., Liu, S., Yu, H., Sang, et al
  2020; 6 (3): eaay4508
- **Nonclassical Crystallization Observed by Liquid-Phase Transmission Electron Microscopy** *Crystallization via Nonclassical Pathways*
  Liu, C., Ou, Z., Zhou, S., Chen, Q.
  American Chemical Society.2020: 115–146
- **Imaging how thermal capillary waves and anisotropic interfacial stiffness shape nanoparticle supracrystals.** *Nature communications*
  Ou, Z. n., Yao, L. n., An, H. n., Shen, B. n., Chen, Q. n.

2020; 11 (1): 4555

- **Charting the quantitative relationship between two-dimensional morphology parameters of polyamide membranes and synthesis conditions** *MOLECULAR SYSTEMS DESIGN & ENGINEERING*
  An, H., Smith, J. W., Chen, W., Ou, Z., Chen, Q.
  2020; 5 (1): 102–9
- **Nanoscale Cinematography of Soft Matter System under Liquid-Phase TEM** *Accounts of Materials Research*
  Ou, Z., Liu, C., Yao, L., Chen, Q.
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- **Effects of Particle Size on Mg2+ Ion Intercalation into lambda-MnO2 Cathode Materials** *NANO LETTERS*
  Chen, W., Zhan, X., Luo, B., Ou, Z., Shih, P., Yao, L., Pidaparthy, S., Patra, A., An, H., Braun, P. V., Stephens, R. M., Yang, H., Zuo, et al
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- **Hierarchical self-assembly of 3D lattices from polydisperse anisometric colloids** *NATURE COMMUNICATIONS*
  Luo, B., Kim, A., Smith, J. W., Ou, Z., Wu, Z., Kim, J., Chen, Q.
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- **Reconfigurable nanoscale soft materials** *CURRENT OPINION IN SOLID STATE & MATERIALS SCIENCE*
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- **Liquid-phase TEM imaging of self-assembly pathways of anisotropic nanoparticles** *Microscopy and Microanalysis*
  Ou, Z., Luo, B., Liu, C., Chen, Q.
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- **Synthesis and Self-Assembly of Janus and Triblock Patchy Particles** *Self-Assembly of Nano- and Micro-structured Materials using Colloidal Engineering*
  Ou, Z., Luo, B., Neophytou, A., Chakrabarti, D., Chen, Q.
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- **Colloidal Metal-Organic Framework Hexapods Prepared from Postsynthesis Etching with Enhanced Catalytic Activity and Rollable Packing** *ACS APPLIED MATERIALS & INTERFACES*
  Ou, Z., Song, X., Huang, W., Jiang, X., Qu, S., Wang, Q., Braun, P., Moore, J. S., Li, X., Chen, Q.
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- **Reconfigurable Polymer Shells on Shape-Anisotropic Gold Nanoparticle Cores** *MACROMOLECULAR RAPID COMMUNICATIONS*
  Kim, J., Song, X., Kim, A., Luo, B., Smith, J. W., Ou, Z., Wu, Z., Chen, Q.
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  Kim, J., Ou, Z., Jones, M. R., Song, X., Chen, Q.
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- **Polymerization-Like Co-Assembly of Silver Nanoplates and Patchy Spheres** *ACS NANO*
  Lao, B., Smith, J. W., Wu, Z., Kim, J., Ou, Z., Chen, Q.
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- **Quantifying the Self-Assembly Behavior of Anisotropic Nanoparticles Using Liquid-Phase Transmission Electron Microscopy** *ACCOUNTS OF CHEMICAL RESEARCH*
  Luo, B., Smith, J. W., Ou, Z., Chen, Q.
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- **In Situ Electron Microscopy Imaging and Quantitative Structural Modulation of Nanoparticle Superlattices** *ACS NANO*
  Kim, J., Jones, M. R., Ou, Z., Chen, Q.
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