(Edmond) Tingtao Zhou

Division of Engineering and Applied Sciences
Caltech, Pasadena, CA-91125

Phone: (617) 697-6885
Email: edmondztt@gmail.com
tingtaoz@caltech.edu

Education

Massachusetts Institute of Technology — Cambridge, MA, USA
Ph. D. in Physics — *2019*
Thesis Title: Phase Transitions Induced Deformation in Porous Media.
Peking University — Beijing, China
B. Sc. in Physics — *2012*

Research Interests

I am a statistical physicist working on real life problems. My current interests can be summarized as: Statistical mechanics and stochastic processes. Electrostatics and electrochemistry. Physics of active or disordered systems and applications in engineering/biological materials, such as cement, bacteria or catheters.

Work Experience

Massachusetts Institute of Technology — Cambridge, MA, USA
Postdoctoral Researcher — *2019.10-2020.03*
California Institute of Technology — Pasadena, CA, USA
Cecil and Sally Drinkward Postdoctoral Fellow — *2020.03-now*

Publications

In prep / Under review:

1. Image charge effects under dielectric and metal boundary conditions, in prep
   T. Zhou, *Z.G. Wang*
2. Nematic interaction between active ellipsoids, in prep
   T. Zhou, *Z. Peng, J. Brady*
3. Activity-induced propulsion of a vesicle, in prep
   Z. Peng, **T. Zhou**, *J. Brady*
4. Theory of freezing point depression in charged porous media, Physical Review E under review.
   T. Zhou, *M. Mirzadeh, R. Pellenq and M. Bazant.*
5. A model for cooperative scientific research inspired by the ant colony algorithm, Journal of Physics Complexity under review
   Z. He, **T. Zhou**.
6. Blistering Failure of Elastic Coatings with Applications to Corrosion Resistance, Journal of Electrochemical Society under review.
   S. Effendy, **T. Zhou**, *H. Eichman, M. Petr, M. Bazant.*

Accepted / Published:

7. Distribution and pressure of active Lévy swimmers under confinement, Journal of Physics A: Mathematical and Theoretical (**2021**)
   T. Zhou, *Z. Peng, M. Gulian, J. Brady*

8. Freezing Point Depression and Material Damage by Nano-fluidic Salt Trapping, Physical Review Fluids (**2020**) 5 (12), 124201
T. Zhou, *M. Mirzadeh, R. Pellenq and M. Bazant.*

9. Interplay of lithium intercalation and plating on a single graphite particle, Joule 5.2 (**2021**): 393-414.
T. Gao, Y. Han, D. Fraggedakis, S. Das, **T. Zhou**, *C.-N. Yeh, S. Xu, W. Chueh, J. Li, M. Bazant*

10. The Effect of Confinement on Capillary Phase Transition In Granular Aggregates, Physical Review Letters (**2020**) 125 (255501)
S. Monfared, **T. Zhou**, *J. Andrade, K. Ioannidou, F. Radjai, F. Ulm and R. Pellenq*

11. Vortices of electro-osmotic flow in heterogeneous porous media.
M. Mirzadeh, **T. Zhou**, *A. Amooie, D. Fraggedakis, T. Ferguson, M. Bazant.* Physical Review Fluids 5, 103701 (**2020**, **Editors' suggestion**).

12. Multiscale Poromechanics of Wet Cement Paste.
T. Zhou, *K. Ioannidou, F. Ulm, M. Bazant and R. Pellenq*, PNAS (**2019**) 116(22): 10652-10657.
(Student paper award in the Engineering Mechanics Institute 2019 conference)

13. Capillary Stress and Structural Relaxation in Moist Granular Materials.
T. Zhou, *K. Ioannidou, E. Masoero, M. Mirzadeh, R. Pellenq and M. Bazant*, Langmuir (**2019**) 35 (12), 4397-4402.

14. Dielectricbreakdown by electric-field induced phase separation.
D. Fraggedakis, M. Mirzadeh, **T. Zhou**, *and M. Bazant.* Journal of The Electrochemical Society, 167(11):113504 (**2020**).

15. A scaling law to determine phase morphologies during ion intercalation.
D. Fraggedakis, N. Nadkarni, T. Gao, **T. Zhou**, *Y. Zhang, Y. Han, R. M. Stephens, Y. Shao-Horn, and M. Bazant.* Energy & Environmental Science (**2020**).

16. Modeling the Metal-Insulator Phase Transition in Li_xCoO_2 for Energy and Information Storage
N. Nadkarni, **T. Zhou**, *D. Fraggedakis, T. Gao and M. Bazant*, Advanced Functional Materials 29, no. 40 (**2019**): 1902821.

17. Inferring Pore Connectivity from Adsorption/Desorption Isotherms.
M. B. Pinson, **T. Zhou**, *H. Jennings and M. Bazant*, Journal of colloid and interface science 532 (**2018**): 118-127.

18. Thermodynamics, Kinetics and Mechanics of Cesium Sorption in Cement Paste: a multi-scale assessment.
J. Arayro, A. Dufresne, **T. Zhou**, *K. Ioannidou, F. Ulm, R. Pellenq and L. Beland* , Physical Review Materials 2, no. 5 (**2018**): 053608.

19. Atomistic and Mesoscale Simulation of Sodium and Potassium Adsorption in Cement Paste
J. Arayro, A. Dufresne, **T. Zhou**, *K. Ioannidou, F. Ulm, R. Pellenq and L. Beland*, The Journal of chemical physics 149, no. 7 (**2018**): 074705.

20. On the IMF in a Triggered Star Formation Context.
T. Zhou, *X. Huang, D. N.C. Lin, M. Gritschneder and H. Lau, 2015*, The Astrophysical Journal 808, no. 1 (**2015**): 10.

21. On the Coagulation and Size Distribution of Pressure Confined Cores.
X. Huang, **T. Zhou**, *T. Kouwenhoven and D. N.C. Lin, 2013*, The Astrophysical Journal 769, no. 1 (**2013**): 23.

Honors and Awards

- Cecil and Sally Drinkward Postdoc Fellowship, 2020
- Student paper award, Engineering Mechanics Institute at Caltech, 2019.
- E.A. Boldt (1953) Fellowship, Massachusetts Institute of Technology, 2012-2013.
- May 4th Award, Peking University, 2009, 2011.
- 1st Prize, Linbridge Prize for Excellent Undergraduate Research in Astrophysics, Kavli Institute for Astronomy and Astrophysics, Peking University, 2010, 2011
- Ming-De Fellowship, Peking University, 2008-2012.

REFERENCES

Prof. Martin Z. Bazant bazant@mit.edu
Departments of Chemical Engineering, and Mathematics, MIT

Prof. John F. Brady jfb@cheme.caltech.edu
Divisions of Chemistry and Chemical Engineering, and Engineering and Applied Science, Caltech

Prof. Sidney Yip syip@mit.edu
Departments of Nuclear Science and Engineering, and Materials Science and Engineering, MIT

Prof. Zhen-Gang Wang zgw@cheme.caltech.edu
Division of Chemistry and Chemical Engineering, Caltech

Dr. Roland J.-M Pellenq pellenq@mit.edu
Department of Civil Engineering, MIT