

(Edmond) Tingtao Zhou

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Education

Massachusetts Institute of Technology

Ph. D. in Physics

Thesis Title: Phase Transitions Induced Deformation in Porous Media.

Cambridge, MA, USA

2019

Peking University

B. Sc. in Physics

Beijing, China

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

Postdoctoral Researcher

Cambridge, MA, USA

2019.10-2020.03

California Institute of Technology

Cecil and Sally Drinkward Postdoctoral Fellow

Pasadena, CA, USA

2020.03-now

Publications

In prep / Under review:

1. Image charge effects under dielectric and metal boundary conditions, submitted to Journal of Chemical Physics.
T. Zhou, Z.G. Wang
2. Nematic interaction between active ellipsoids, in prep
T. Zhou, Z. Peng, J.F. Brady
3. Turbulent transport of dusts in proto-planetary disks, in prep
T. Zhou, Y. Chen and D. N.C. Lin
4. Activity-induced propulsion of a vesicle, in prep
Z. Peng, T. Zhou, J.F. Brady
5. Soft-mode and Anderson-like localization in two-phase disordered media, Physical Review B under review.
T. Zhou, D. Fragedakis, F. Wang

Accepted / Published:

6. Distribution and pressure of active Lévy swimmers under confinement, Journal of Physics A: Mathematical and Theoretical (**2021**)
T. Zhou, Z. Peng, M. Gulian, J.F. Brady
7. Theory of freezing point depression in charged porous media, Physical Review E (**2021**).
T. Zhou, M. Mirzadeh, R. Pellenq and M.Z. Bazant.

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.Z. Bazant.
9. Multiscale Poromechanics of Wet Cement Paste.
T. Zhou, K. Ioannidou, F. Ulm, M.Z. Bazant and R. Pellenq, PNAS (**2019**) 116(22): 10652-10657.
(**Student paper award in the Engineering Mechanics Institute 2019 conference**)
10. Capillary Stress and Structural Relaxation in Moist Granular Materials.
T. Zhou, K. Ioannidou, E. Masoero, M. Mirzadeh, R. Pellenq and M.Z. Bazant, Langmuir (**2019**) 35 (12), 4397-4402.
11. On the IMF in a Triggered Star Formation Context.
T. Zhou, X. Huang, D. N.C. Lin, M. Gritschneider and H. Lau, 2015, The Astrophysical Journal 808, no. 1 (**2015**): 10.
12. Blistering Failure of Elastic Coatings with Applications to Corrosion Resistance, Soft Matter (**2021**).
S. Effendy, T. Zhou, H. Eichman, M. Petr, M.Z. Bazant.
13. Interplay of lithium intercalation and plating on a single graphite particle, Joule 5.2 (**2021**): 393-414.
T. Gao, Y. Han, D. Fragedakis, S. Das, T. Zhou, C.-N. Yeh, S. Xu, W. Chueh, J. Li, M.Z. Bazant
14. 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
15. Vortices of electro-osmotic flow in heterogeneous porous media.
M. Mirzadeh, T. Zhou, A. Amooie, D. Fragedakis, T. Ferguson, M.Z. Bazant. Physical Review Fluids 5, 103701 (**2020**, Editors' suggestion).
16. Dielectricbreakdown by electric-field induced phase separation.
D. Fragedakis, M. Mirzadeh, T. Zhou, and M.Z. Bazant. Journal of The Electrochemical Society, 167(11):113504 (**2020**).
17. A scaling law to determine phase morphologies during ion intercalation.
D. Fragedakis, N. Nadkarni, T. Gao, T. Zhou, Y. Zhang, Y. Han, R. M. Stephens, Y. Shao-Horn, and M.Z. Bazant. Energy & Environmental Science (**2020**).
18. Modeling the Metal-Insulator Phase Transition in Li_xCoO_2 for Energy and Information Storage
N. Nadkarni, T. Zhou, D. Fragedakis, T. Gao and M.Z. Bazant, Advanced Functional Materials 29, no. 40 (**2019**): 1902821.
19. Inferring Pore Connectivity from Adsorption/Desorption Isotherms.
M. B. Pinson, T. Zhou, H. Jennings and M.Z. Bazant, Journal of colloid and interface science 532 (**2018**): 118-127.
20. 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.
21. 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.
22. 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.