

Matthew Yates | curriculum vitæ

Department of Chemical Engineering – University of Rochester

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Education

University of Texas

Ph.D., Chemical Engineering

Advisor: Prof. Keith Johnston

Austin, TX

1994–1999

Tulane University

B.S., Chemical Engineering

Undergraduate thesis advisor: Prof. Kyriakos D. Papadopoulos

New Orleans, LA

1990–1994

Professional Experience

University of Rochester

Department of Chemical Engineering

- Professor (2013–present)
- Materials Science Program (2001–present)
- Laboratory for Laser Energetics (2002–present)
- Department Chair (2009–2018)
- Associate Professor (2006–2012)
- Assistant Professor (2001–2006)

Rochester, NY

2001–present

Max-Planck Institute

Institute of Colloid and Interface Science

- Postdoctoral Fellow
- Advisor: Dr. Frank Caruso

Potsdam, Germany

2001–2003

Los Alamos National Laboratory

Chemistry Division

- Postdoctoral Fellow
- Advisor: Dr. T. Mark McCleskey

Los Alamos, NM

1999–2001

Honors and Awards

NSF International Research Fellowship: Max-Planck Institute, Potsdam

2001–2003

Director's Fellowship: Los Alamos National Laboratory

1999–2001

Harold Levey Alumni Award: Tulane University

1999

Endowed Presidential Scholarship: Society of Plastics Engineers

1996

Research Interests

- Advanced Materials
- Colloids and Interfaces
- Coatings
- Electrochemistry
- Sensors
- Open Source Hardware

Teaching Interests

- Thermodynamics
- Reaction Kinetics
- Colloid and Surface Science
- Energy Systems
- Numerical Methods and Statistics
- Python Applied to Chemical Engineering

University and Departmental Service

Faculty Council	2019–present
Chemical Engineering Department Chair	2009–2018
University Strategic Planning Committee on Energy	2007
University Administrative Committee	2006–2009
Director of the Chemical Engineering Graduate Program	2004–2006
University Graduate Studies Committee	2006–2009
Organizer of Chemical Engineering Departmental Seminar Series	2002–2004

Publications

Journal Articles

- [1] Irving, P., Cecil, R., and Yates, M. Z., “MYSTAT: A compact potentiostat/galvanostat for general electrochemistry measurements,” *HardwareX*, 9, e00163, **2021**, <http://dx.doi.org/10.1016/j.ohx.2020.e00163>.
- [2] Tyndall, N. F., Stievater, T. H., Kozak, D. A., Pruessner, M. W., Roxworthy, B. J., Rabinovich, W. S., Roberts, C. A., McGill, R. A., Miller, B. L., Luta, E., and Yates, M. Z., “Figure-of-Merit Characterization of Hydrogen-Bond Acidic Sorbents for Waveguide-Enhanced Raman Spectroscopy,” *Acs Sensors*, 5(3), 831–836, **2020**, <http://dx.doi.org/10.1021/acssensors.9b02513>.
- [3] Chen, Q., Wu, L., Zeng, Y., Jia, C., Lin, J., Yates, M. Z., and Guan, B., “Formation of spherical calcium sulfate mesocrystals: orientation controlled by subunit growth,” *Crystengcomm*, 21(39), 5973–5979, **2019**, <http://dx.doi.org/10.1039/c9ce00982e>.
- [4] Ghosh, R., Swart, O., Westgate, S., Miller, B. L., and Yates, M. Z., “Antibacterial Copper-Hydroxyapatite Composite Coatings via Electrochemical Synthesis,” *Langmuir*, 35(17), 5957–5966, **2019**, <http://dx.doi.org/10.1021/acs.langmuir.9b00919>.
- [5] Zhang, X. and Yates, M. Z., “Controllable synthesis of hydroxyapatite-supported palladium nanopar-

- ticles with enhanced catalytic activity,” *Surface & Coatings Technology*, 351, 60–67, **2018**, <http://dx.doi.org/10.1016/j.surfcoat.2018.07.075>.
- [6] Zhang, X. and Yates, M. Z., “Enhanced Photocatalytic Activity of TiO₂ Nanoparticles Supported on Electrically Polarized Hydroxyapatite,” *Acs Applied Materials & Interfaces*, 10(20), 17232–17239, **2018**, <http://dx.doi.org/10.1021/acsami.8b03838>.
- [7] Zhang, X., Zhang, Y., and Yates, M. Z., “Hydroxyapatite Nanocrystal Deposited Titanium Dioxide Nanotubes Loaded with Antibiotics for Combining Biocompatibility and Antibacterial Properties,” *MRS Advances*, 3(30), 1703–1709, **2018**, <http://dx.doi.org/10.1557/adv.2018.114>.
- [8] Chen, Q., Jia, C., Li, Y., Xu, J., Guan, B., and Yates, M. Z., “alpha-Calcium Sulfate Hemihydrate Nanorods Synthesis: A Method for Nanoparticle Preparation by Mesocrystallization,” *Langmuir*, 33(9), 2362–2369, **2017**, <http://dx.doi.org/10.1021/acs.langmuir.7b00013>.
- [9] Zhang, X., Chaimayo, W., Yang, C., Yao, J., Miller, B. L., and Yates, M. Z., “Silver-hydroxyapatite composite coatings with enhanced antimicrobial activities through heat treatment,” *Surface & Coatings Technology*, 325, 39–45, **2017**, <http://dx.doi.org/10.1016/j.surfcoat.2017.06.013>.
- [10] Fu, C., Zhang, X., Savino, K., Gabrys, P., Gao, Y., Chaimayo, W., Miller, B. L., and Yates, M. Z., “Antimicrobial silver-hydroxyapatite composite coatings through two-stage electrochemical synthesis,” *Surface & Coatings Technology*, 301, 13–19, **2016**, <http://dx.doi.org/10.1016/j.surfcoat.2016.03.010>.
- [11] Fu, C., Savino, K., Gabrys, P., Zeng, A., Guan, B., Olvera, D., Wang, C., Song, B., Awad, H., Gao, Y., and Yates, M. Z., “Hydroxyapatite thin films with giant electrical polarization,” *Chemistry of Materials*, 27(4), 1164–1171, **2015**, <http://dx.doi.org/10.1021/cm503364s>.
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- [13] Savino, K. and Yates, M. Z., “Thermal stability of electrochemical-hydrothermal hydroxyapatite coatings,” *Ceramics International*, 41(7), 8568–8577, **2015**, <http://dx.doi.org/10.1016/j.ceramint.2015.03.065>.
- [14] Tsai, H.-Y., Lee, A., Peng, W., and Yates, M. Z., “Synthesis of poly(n-isopropylacrylamide) particles for metal affinity binding of peptides,” *Colloids and Surfaces B-Biointerfaces*, 114, 104–110, **2014**, <http://dx.doi.org/10.1016/j.colsurfb.2013.09.060>.
- [15] Tsai, H.-Y., Vats, K., Yates, M. Z., and Benoit, D. S. W., “Two-dimensional patterns of poly(n-isopropylacrylamide) microgels to spatially control fibroblast adhesion and temperature-responsive detachment,” *Langmuir*, 29(39), 12183–12193, **2013**, <http://dx.doi.org/10.1021/la400971g>.
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- [17] Kong, B., Guan, B., Yates, M. Z., and Wu, Z., "Control of alpha-calcium sulfate hemihydrate morphology using reverse microemulsions," *Langmuir*, 28(40), 14137–14142, **2012**, <http://dx.doi.org/10.1021/la302459z>.
- [18] Wei, X., Fu, C., Savino, K., and Yates, M. Z., "Carbonated hydroxyapatite coatings with aligned crystal domains," *Crystal Growth & Design*, 12(7), 3474–3480, **2012**, <http://dx.doi.org/10.1021/cg201685x>.
- [19] Wei, X., Fu, C., Savino, K., and Yates, M. Z., "Fully dense yttrium-substituted hydroxyapatite coatings with aligned crystal domains," *Crystal Growth & Design*, 12(1), 217–223, **2012**, <http://dx.doi.org/10.1021/cg200943s>.
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- [21] Liu, D., Savino, K., and Yates, M. Z., "Coating of hydroxyapatite films on metal substrates by seeded hydrothermal deposition," *Surface & Coatings Technology*, 205(16), 3975–3986, **2011**, <http://dx.doi.org/10.1016/j.surfcoat.2011.02.008>.
- [22] Lee, A., Tsai, H.-Y., and Yates, M. Z., "Steric stabilization of thermally responsive n-isopropylacrylamide particles by poly(vinyl alcohol)," *Langmuir*, 26(23), 18055–18060, **2010**, <http://dx.doi.org/10.1021/la1039128>.
- [23] Wei, X. and Yates, M. Z., "Control of Nafion®/poly(vinylidene fluoride-co-hexafluoropropylene) composite membrane microstructure to improve performance in direct methanol fuel cells," *Journal of the Electrochemical Society*, 157(4), B522–B528, **2010**, <http://dx.doi.org/10.1149/1.3305806>.
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- [27] Yin, W. and Yates, M. Z., "Encapsulation and sustained release from biodegradable microcapsules made by emulsification/freeze drying and spray/freeze drying," *Journal of Colloid and Interface Science*, 336(1), 155–161, **2009**, <http://dx.doi.org/10.1016/j.jcis.2009.03.065>.
- [28] Liu, D. and Yates, M. Z., "Tailoring the structure of S-PEEK/PDMS proton conductive membranes through applied electric fields," *Journal of Membrane Science*, 322(1), 256–264, **2008**, <http://dx.doi.org/10.1016/j.memsci.2008.05.059>.

- [29] Yin, W. and Yates, M. Z., "Effect of interfacial free energy on the formation of polymer microcapsules by emulsification/freeze-drying," *Langmuir*, 24(3), 701–708, **2008**, <http://dx.doi.org/10.1021/la7022693>.
- [30] Liu, D. and Yates, M. Z., "Fabrication of size-tunable TiO₂ tubes using rod-shaped calcite templates," *Langmuir*, 23(20), 10333–10341, **2007**, <http://dx.doi.org/10.1021/la701335j>.
- [31] Yin, W., Dong, Z., Chen, X., Finn, N., and Yates, M. Z., "Hydrophobic ion pairing to enhance encapsulation of water-soluble additives into CO₂-swollen polymer microparticles," *Journal of Supercritical Fluids*, 41(2), 293–298, **2007**, <http://dx.doi.org/10.1016/j.supflu.2006.09.009>.
- [32] Yin, W., Liu, H., Yates, M. Z., Du, H., Jiang, F., Guo, L., and Krauss, T. D., "Fluorescent quantum dot-polymer nanocomposite particles by emulsification/solvent evaporation," *Chemistry of Materials*, 19(12), 2930–2936, **2007**, <http://dx.doi.org/10.1021/cm070214g>.
- [33] Huang, Y. J. and Yates, M. Z., "Copper etching by water-in-oil microemulsions," *Colloids and Surfaces A-Physicochemical and Engineering Aspects*, 281(1-3), 215–220, **2006**, <http://dx.doi.org/10.1016/j.colsurfa.2006.02.041>.
- [34] Lin, J.-C. and Yates, M. Z., "Growth of oriented molecular sieve thin films from aligned seed layers," *Chemistry of Materials*, 18(17), 4137–4141, **2006**, <http://dx.doi.org/10.1021/cm060154z>.
- [35] Liu, D. X. and Yates, M. Z., "Formation of rod-shaped calcite crystals by microemulsion-based synthesis," *Langmuir*, 22(13), 5566–5569, **2006**, <http://dx.doi.org/10.1021/la060612i>.
- [36] Baker, G. A., Campbell, M. L., Yates, M. Z., and McCleskey, T. M., "Carbon dioxide emulsion assisted loading of polymer microspheres toward sustained release materials," *Langmuir*, 21(9), 3730–3732, **2005**, <http://dx.doi.org/10.1021/la047146m>.
- [37] Lin, J. C. and Yates, M. Z., "Altering the crystal morphology of Silicalite-1 through microemulsion-based synthesis," *Langmuir*, 21(6), 2117–2120, **2005**, <http://dx.doi.org/10.1021/la0473456>.
- [38] Liu, H., Finn, N., and Yates, M. Z., "Encapsulation and sustained release of a model drug, indomethacin, using CO₂-based microencapsulation," *Langmuir*, 21(1), 379–385, **2005**, <http://dx.doi.org/10.1021/la047934b>.
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- [40] Lin, J. C., Yates, M. Z., Petkoska, A. T., and Jacobs, S., "Electric-field-driven assembly of oriented molecular-sieve films," *Advanced Materials*, 16(21), 1944–1948, **2004**, <http://dx.doi.org/10.1002/adma.200400424>.
- [41] Lin, J. C., Dipre, J. T., and Yates, M. Z., "Microemulsion-directed synthesis of molecular sieve fibers," *Chemistry of Materials*, 15(14), 2764–2773, **2003**, <http://dx.doi.org/10.1021/cm0341437>.

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- [47] Yates, M. Z., Apodaca, D. L., Campbell, M. L., Birnbaum, E. R., and McCleskey, T. M., "Metal extractions using water in carbon dioxide microemulsions," *Chemical Communications*, (01), 25–26, **2001**, <http://dx.doi.org/10.1039/b007331h>.
- [48] Calvo, L., Holmes, J. D., Yates, M. Z., and Johnston, K. P., "Steric stabilization of inorganic suspensions in carbon dioxide," *Journal of Supercritical Fluids*, 16(3), 247–260, **2000**, [http://dx.doi.org/10.1016/S0896-8446\(99\)00036-4](http://dx.doi.org/10.1016/S0896-8446(99)00036-4).
- [49] Li, G., Yates, M. Z., Johnston, K. P., and Howdle, S. M., "In-situ investigation on the mechanism of dispersion polymerization in supercritical carbon dioxide," *Macromolecules*, 33(11), 4008–4014, **2000**, <http://dx.doi.org/10.1021/ma9921504>.
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- [53] Sengupta, T., Yates, M., and Papadopoulos, K. D., "Metal complexation with surface-active Kemp's triacid," *Colloids and Surfaces a-Physicochemical and Engineering Aspects*, 148(3), 259–270, **1999**, [http://dx.doi.org/10.1016/S0927-7757\(98\)00714-6](http://dx.doi.org/10.1016/S0927-7757(98)00714-6).

- [54] Shim, J. J., Yates, M. Z., and Johnston, K. P., "Polymer coatings by rapid expansion of suspensions in supercritical carbon dioxide," *Industrial & Engineering Chemistry Research*, 38(10), 3655–3662, **1999**, <http://dx.doi.org/10.1021/ie990039g>.
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Books

- [1] Johnston, K. P., da Rocha, S. R. P., Lee, C. T., Li, G., and Yates, M. Z., "Colloid and interface science for carbon dioxide-based pharmaceutical processes," in: *Supercritical Fluid Technology for Drug Development*, edited by York, P., Kimpella, U. B., and Shekunov, B. Y. (Marcel Dekker: New York), **2004**.
- [2] Johnston, K. P., da Rocha, S. R. P., Holmes, J. D., Jacobson, G. B., Lee, C. T., and Yates, M. Z., "Interfacial phenomena with carbon dioxide-soluble surfactants," in: *Green Chemistry Using Liquid and Supercritical Carbon Dioxide*, edited by DeSimone, J. M. and Tumas, W. (Oxford University Press), **2003**.

- [3] Johnston, K. P., Holmes, J., Jacobson, G., Lee, T., Li, G., and Yates, M. Z., "Reactions and synthesis in microemulsions and emulsions in carbon dioxide," in: *Reactions and Synthesis in Surfactant Systems*, edited by Texter, J. (Marcel Dekker: New York), **2001**.
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Patents

- [1] Yates, M. Z., Savino, K., Gabrys, P., and Fu, C., "Polarized hydroxyapatite films and methods of making and using same," Number: WO2015138387, **2015**.
- [2] Yates, M. Z. and Liu, D., "Ion-conducting ceramic apparatus, method, fabrication, and applications," Number: U.S. 8,129,072, **2012**.
- [3] Yates, M. Z. and Liu, D., "Ion/proton-conducting apparatus and method," Number: U.S. 7,943,269, **2011**.
- [4] Tumas, W., Ott, K. C., McCleskey, T. M., Yates, M. Z., and Birnbaum, E. R., "Microporous crystals and synthesis schemes," Number: U.S. 6,949,238, **2005**.
- [5] Yates, M. Z. and J-C., L., "Microporous crystals and methods of making thereof," Number: WO2004070784, **2004**.
- [6] McCleskey, T. M. and Yates, M. Z., "Incorporation of additives into polymers," Number: U.S. 6,599,962, **2003**.

Presentations

Invited Presentations

- [1] Yates, M. Z., "Carbon dioxide as a clean solvent for microencapsulation," *Green Chemistry Conference, Zhejiang University of Technology*, Hangzhou, China, **2013**.
- [2] Yates, M. Z., "Hydroxyapatite coatings with enhanced proton conductivity," *Institute for Advanced Studies, Hong Kong University of Science and Technology*, Hong Kong, **2013**.
- [3] Yates, M. Z., "Hydroxyapatite coatings with enhanced proton conductivity," *Department of Chemical Engineering, Zhejiang University*, Hangzhou, China, **2013**.
- [4] Yates, M. Z., "Hydroxyapatite coatings with enhanced proton conductivity," *Department of Chemical Engineering, SUNY-Buffalo*, Buffalo, NY, **2013**.
- [5] Yates, M. Z., "Novel polymer and hydrogel particles for microencapsulation," *Northwest University*, Xi'an, China, **2013**.
- [6] Yates, M. Z., "Surface crystallization to optimize nanostructure of proton conductors in hydrogen membrane fuel cells," *NSF CMMI Research and Innovation Conference*, Boston, MA, **2012**.

- [7] Yates, M. Z., "Surface crystallization to optimize nanostructure of proton conductors in hydrogen membrane fuel cells," *NSF CMMI Research and Innovation Conference*, Atlanta, GA, **2011**.
- [8] Yates, M. Z., "Novel hydrogel nanoparticles as carriers for proteins and peptides," *Particles 2010 - Medical/Biochemical Diagnostic, Pharmaceutical, and Drug Delivery Applications of Particle Technology*, Orlando, FL, **2010**.
- [9] Yates, M. Z., "Synthesis of novel fuel cell membranes with aligned proton conducting pathways," *Alfred University*, Alfred, NY, **2009**.
- [10] Yates, M. Z., "Synthesis of novel fuel cell membranes with aligned proton conducting pathways," *Case Western Reserve University*, Cleveland, OH, **2009**.
- [11] Yates, M. Z., "Colloidal engineering and assembly," *Georgia Institute of Technology, Department of Chemical Engineering*, Atlanta, GA, **2007**.
- [12] Yates, M. Z., "Nanoengineering materials for drug delivery, sensing, and fuel cell membranes," *Yeungnam University*, Daegu, Korea, **2007**.
- [13] Yates, M. Z., "Colloidal engineering and assembly," *Tulane University, Department of Chemical Engineering*, New Orleans, LA, **2006**.
- [14] Yates, M. Z., "Colloidal engineering and assembly," *University of Texas, Department of Chemical Engineering*, Austin, TX, **2006**.
- [15] Yates, M. Z., "Microencapsulation through hybrid aqueous/supercritical carbon dioxide processing of polymer colloids," *Particles 2006 - Medical/Biochemical Diagnostic, Pharmaceutical, and Drug Delivery Applications of Particle Technology*, Orlando, FL, **2006**.
- [16] Yates, "Electric field driven formation of thin films of aligned rod shaped particles," *79th ACS Colloid and Surface Science Symposium*, Potsdam, NY, **2005**.
- [17] Yates, M., "Microencapsulation of pharmaceuticals using compressed carbon dioxide swelling of biodegradable colloids," *79th ACS Colloid and Surface Science Symposium*, Potsdam, NY, **2005**.
- [18] Yates, M. Z., "Colloidal engineering and assembly," *University of Cincinnati, Department of Chemical and Materials Engineering*, Cincinnati, OH, **2005**.
- [19] Yates, M. Z., "Colloidal engineering and assembly: New materials for optoelectronics, controlled release, and membranes," *Kodak Research and Development*, Rochester, NY, **2004**.
- [20] Yates, M. Z., Liu, H., Bonino, C., Du, K., and Krauss, T. D., "Encapsulation of quantum dots into polymer microspheres," *Northeast Regional ACS Meeting*, Rochester, NY, **2004**.
- [21] Yates, M. Z., "Synthesis and assembly of optically functional particles," *Optoelectronic Applications of Quantum Dots and Nanoparticles*, Grasmere, England, **2003**.
- [22] Yates, M. Z. and Liu, H., "Colored and fluorescent polymer particles via carbon dioxide assisted microencapsulation," *Particles 2003: Imaging, Marking, and Printing Applications of Particle Technology*, Toronto, Canada, **2003**.

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