Stanford

Ian Coates

- Ph.D. Student in Chemical Engineering, admitted Autumn 2021
- Senior Research Scientist, Chemical Engineering
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Bio

BIO

I am a chemical engineer advancing photopolymerization chemistry, fluid mechanics, and materials science to enable fabrication strategies once thought impossible. Pioneered injection Continuous Liquid Interface Production (iCLIP), using active resin chemistry and fluid–optical coupling to achieve order-of-magnitude gains in 3D printing speed and resolution, and translated chemical control of reactive interfaces into free-form microfluidic microneedle systems for intradermal delivery of small molecules, biologics, and mRNA. Current research applies water-soluble biocompatible sacrificial resins and projection-based fabrication workflows to design and print high-resolution, perfusable microvascular architectures for integration into 3D tissue patches.

Publications

PUBLICATIONS

- **Tunable Applicator for Microneedle-Based Medical Devices** *ADVANCED MATERIALS TECHNOLOGIES*
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- **Free-Form Microfluidic Microneedle Array Patches** *ADVANCED FUNCTIONAL MATERIALS*
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- **Lyophilized SARS-CoV-2 self-amplifying RNA vaccines for microneedle Array patch delivery.** *Journal of controlled release : official journal of the Controlled Release Society*
  Driskill, M. M., Coates, I. A., Hurst, P. J., Rajesh, N. U., Dulay, M. T., Waymouth, R. M., Akahata, W., Matsuda, K., Smith, J. F., Jacobson, G. B., Perry, J. L., Tian, S., DeSimone, et al
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- **High-resolution stereolithography: Negative spaces enabled by control of fluid mechanics.** *Proceedings of the National Academy of Sciences of the United States of America*
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- **3D-Printed Latticed Microneedle Array Patches for Tunable and Versatile Intradermal Delivery.** *Advanced materials (Deerfield Beach, Fla.)*
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- **Growing three-dimensional objects with light.** *Proceedings of the National Academy of Sciences of the United States of America*
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- **Methods for modeling and real-time visualization of CLIP and iCLIP-based 3D printing** *GIANT*
  Lipkowitz, G., Coates, I., Krishna, N., Shaqfeh, E. S. G., DeSimone, J. M.
  2024; 17

- **Printing atom-efficiently: faster fabrication of farther unsupported overhangs by fluid dynamics simulation**
  Lipkowitz, G., Krishna, N., Coates, I., Shaqfeh, E. S. G., DeSimone, J. M.
  edited by Spencer, S. N.
  ASSOC COMPUTING MACHINERY.2023

- **3D-Printed Microarray Patches for Transdermal Applications.** *JACS Au*
  Rajesh, N. U., Coates, I., Driskill, M. M., Dulay, M. T., Hsiao, K., Ilyin, D., Jacobson, G. B., Kwak, J. W., Lawrence, M., Perry, J., Shea, C. O., Tian, S., DeSimone, et al
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