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Fabrication of Micro-Batteries via Stop-Flow Lithography

Chaoqun Ding, Department of Chemical Engineering, Purdue University
Ernesto Marinero, Department of Materials Engineering, Purdue University
Carlos Martinez, Department of Materials Engineering, Purdue University

ABSTRACT

Fabrication of micro-MEM devices and stretchable wearable electronics is important for future applications in materials, medicine and drug delivery. A key challenge in this area is the fabrication of rechargeable micro batteries with thicknesses < 500 μm, area < 0.1 mm2, energy densities of at least 1 to 10μWh cm-2 μμm-1. The overarching aim of this project is to develop a robust platform to fabricate micro batteries by combining double emulsion generation to fabricate porous microspheres that will serve as the anode and cathode materials and stop-flow lithography in microfludic devices to assemble the battery internals in a single step. In this presentation, I will discuss the tasks performed to assemble the stop flow lithography system, and the generation of active materials from double emulsions. The tasks include: (1) setting up the shutter and solenoid as well as syncing their operation, (2) fabricated masks for micro-particles by electric cutter and printing method, (3) performed trials to fabricate particles of different sizes and shapes, and (4) fabricated and operated double emulsion devices. The work accomplished during the summer serves as a strong foundation for the rest of the project.

KEYWORDS

Micro-Batteries fabrication, Stop-flow lithography, double emulsion drops, energy, mask fabrication