CHALMERS
UNIVERSITY OF TECHNOLOGY

MC2

Master Thesis project in Microtechnology and Nanoscience

Asymmetric Micro-Supercapacitors by Electrodeposition

Micro-supercapacitors (MSCs) are energy storage devices on a micro scale, offer a possibility of seamless on-chip integrations with other components to construct e.g. miniaturized self-powered systems. The MSC configuration is typically interdigital fingers on a planar substrate. Currently, there is difficulty in fabricating *asymmetric* MCSs that have advantages in wider voltage window and higher energy density. Asymmetric MSCs are constituted of positive and negative electrodes based on two different kinds of materials. It is a challenge to precisely deposit the two materials on the interdigital patterns, and separate them by a space on the order of micrometers.

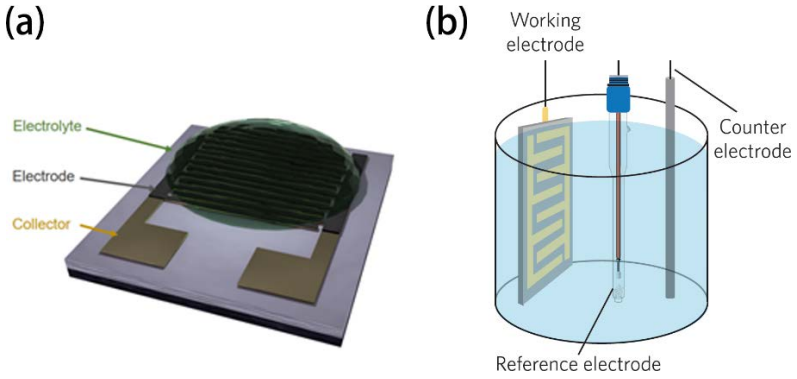

Figure 1. (a) Micro-supercapacitor. (b) Electrodeposition setup (*Nature Technology*, 12 (2017) 7)

The objective of this thesis is to fabricate asymmetric MSCs using electrodeposition method, with one electrode based on MnO_2 or conductive polymers and the other electrode based on carbon e.g. CNTs, rGO (reduced graphene oxide). The MnO_2 or conductive polymers should be electrodeposited, and the carbon electrode can be fabricated by electrodeposition, or direct transfer of the material powder onto the interdigital pattern which was developed in our laboratory. The thesis will involve design, fabrication and characterization of MCSs on wafer scale.

Qualifications

A suitable background for this project would be a Master's program in Chemistry, Nanotechnology, Physics, Electrical Engineering, Microelectronics, or related subject. Knowledge in electrochemistry, cleanroom experience is a plus.

Application

Send an email to one of the following contact persons.

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