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Microfabricated sample chambers and electrode arrays for single GUV manipulation for two-photon imaging and spectroscopy

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Authors

Celli, A
Sutin, J
Gratton, E

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Anna Celli, Jason D B Sutin, and Enrico Gratton.

Microfabricated sample chambers and electrode arrays for single GUV manipulation for two-photon imaging and spectroscopy.

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Abstract

The geometry of GUVs and the fact that their chemical composition is completely controlled makes them an optimal model for the cellular membrane. However, since GUVs are currently grown in bulk and each experiment requires a new sample preparation, comparison of results to a control sample is difficult. Furthermore, under many conditions the GUVs remain connected to the lipid reservoir needed for their formation allowing interference with the physical effects under observation. In addition, the large volume of the bulk solution and the presence of the lipid reservoir make quantitative measurements difficult. To overcome these problems, we are developing microfabricated devices to separate and maintain isolated GUVs in a method compatible with two-photon microscopy. We are using poly-dimethyl-silicone (PDMS) to create chambers to hold individual GUVs. This will allow measurement on GUVs from the same preparation under different experimental conditions. In addition we have created arrays of transparent electrodes of indium tin oxide to produce and manipulate the vesicles while keeping them close enough to the surface to use high numerical aperture immersion objectives. Supported by NIH. PHS 5 P41 RRO3155.