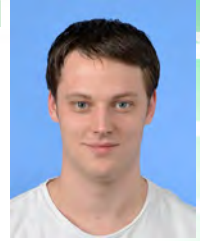


Nanochannel Based STEM Liquid Cell

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Keywords STEM, Nanochannel, Liquid imaging



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Context

Most micromachined devices for use in electron-microscopic imaging in liquid environments consist of 2 separate silicon chips. These chips contain large, thin silicon nitride membranes that are transparent to electrons[1]. This type of device requires critical assembly and sealing steps when preparing microscopic samples and provides little control on the liquid layer thickness that is used. The new design aims at removing the critical assembly steps for individual devices and gaining more control on the liquid layer thickness in the device. Moreover, this nanochannel based design makes the use of thinner liquid layers feasible, thereby improving the overall achievable imaging resolution.

mately is to be able to observe lipid membranes in a liquid environment with an electron microscope and to study the behavior of membrane proteins. Before this can be done, the achievable resolution has to be determined.

Results

Some tests using gold nanoparticles have been performed to form an idea of the achievable resolution. Smaller particles still have to be tested as well as biological materials, which will show a worse resolution limit. To give an idea of the resolution achieved with this design, some images of gold nanoparticles suspended in a 500nm thick water layer are shown in the attached figures.



Fig. 1. Gold nanoparticle cluster 100/50nm

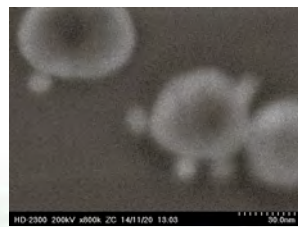


Fig. 2. Gold nanoparticle cluster 50/15nm

Objectives & Methods

The objective of this project is to investigate the achievable resolution of electron-microscopic images in a liquid environment using the new nanochannel liquid cell. The long term goal ul-

References

[1] N. de Jonge and F.M. Ross, Nat. Nanotechnol., 6, p.695, (2011).