



KTH School of Biotechnology Department of Nanobiotechnology

Head of Department: Associate Prof. Helene Andersson Svahn

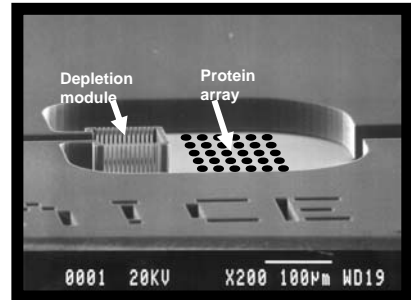
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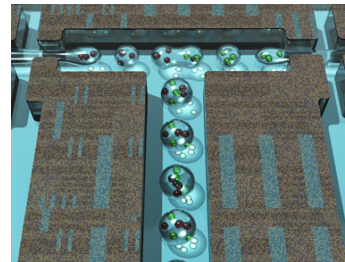
The Department of Nanobiotechnology was formed in 2005 and is involved in different aspects of micro and nanotechnologies for biotech applications. Nanobiotechnology is an emerging discipline at the interface of traditional biotechnology and cutting-edge nanotechnology. The initial focus is on the development of the next generation further miniaturized and integrated, nanotechnology based protein and cell chips, which can be used for biomarker discovery and single cell analysis.

Over the next 10 to 20 years, medicine will move toward predictive and preventive modes. New technologies will allow individuals to have the relevant portions of their genome sequenced. Multiparameter informative molecular diagnostics via blood analysis will become a routine procedure for assessing health and disease status. A great need therefore exists to develop novel methods that are accurate, fast and affordable. Nanobiotechnology devices are emerging as highly sensitive and real time detectors for genes, proteins and cells. It is likely that within the next 5-10 years miniaturized and automated microfluidics/nanotech platforms that integrate operations such as cell sorting and serum purification with measurements of 5-10 biomarkers from single cells or very small fluid volumes will emerge.

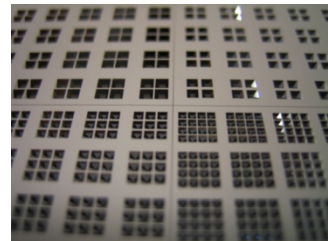
The group is focusing on interdisciplinary research with a focus to combine nanotechnology, microfluidics with various biotechnology applications. The research is divided into several subprojects, including development of microplate platforms for high throughput single cell/clone analysis to enable analysis of single cell heterogeneity related to drug sensitivity. In addition, new magnetic bead based assays have been developed which enables, faster analysis, naked eye detection, and the development of portable devices. Focus is on portable screening device for infectious diseases and allergy (in collaboration with PhaDia, Uppsala). Recently, a strategic collaboration has been initiated with the US-based company Raindance to develop sensitive methods for protein detection with microfluidics devices based on microdroplets (a technology originally developed at the MRC, Cambridge). The aim is to continue the path of using micro-fabricated devices to develop flexible, high-throughput fluid handling and assay system for a wide variety of industrial and research applications in close collaboration with the HPR effort as well as other internal and external research groups.



Microfluidic chip for serum depletion and analysis.



Droplet-based microfluidics for single cell analysis.



Single cell plate. Miniaturized wells for single cell cultivation and analysis. Single cells are seeded into the wells by a FACS and then cultivated for 7-12 days. Many different parameters can be studied on a single cell level in high throughput.

Research Group



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REFERENCES:

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2. L. Barbe L et al., *Mol Cell Proteomics*. 2008, 7 (3), 499.
3. P. Ståhl et al., *Genomics*, 2007, 90 (6), 741.

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Collaborations:
Raindance Technologies
PicoVitro AB

Centra: