



KTH School of Biotechnology

Division of Bioprocess Technology

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At the Div. of Bioprocess Technology, research is focused on studies of the physiology of microorganisms and animal cells under process conditions. A large amount of the work is performed with cells hosting expression systems for recombinant protein production and covers both cultivation and downstream processing.

***E. coli* technology.** The research of this group is focused on limiting factors in the production of recombinant proteins. This involves the use of engineered cells to achieve better properties with respect to production but also vector engineering. The former concerns the use of cells which are engineered to reduce the growth rate also at batch cultivation without the production of acetic acid but also cells which are generally easier to control with respect to a specific production rate.

The latter concerns the use of new promoters and new expression systems for extra-cytoplasmic production. The group works also with the control of fedbatch operation, specifically with factors influencing the product quantity and quality. Techniques for steering of proteolysis and inclusion body formation and techniques to control the rate of product synthesis are in focus.

The work has specifically involved the studies of *E. coli* membranes with respect to phospholipids and fatty acids as well as proteins. This work was done to understand how recombinant products can escape the cytosol and enrich in the periplasm and in the medium. This has led to the present activities in the surface expression of proteins. The goal is to produce difficult proteins in this way but also to rapidly produce and immobilise enzymes on the surface. The latter is used as a tool in biocatalysis collaborations. The group has furthermore a many-year experience in the scale-up of bioprocesses to large production scale.



Pilot plant. The division has access to a pilot plant facility which is used for contract research & manufacturing and for education. The plant has been running for more than 30 years but was upgraded to new-standard in 2001. KTH has thus more than 25 years of experience in this field. The largest bioreactor is 700L and downstream processing is available to match the large scale production. The plant is further described under the home page: www.bioproduce.se. In connection to the plant is a 6-parallel bioreactor where fast process development can be made on contract basis. This is performed both for pro- and eucaryotic cells. The contacts are directed to collaboration with all types of bioindustry.

Animal cell technology. The work has restarted in 2008 and concerns presently the contract research and development using various cell lines in collaboration with the pharmaceutical industry.

Senior scientists



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Cultivation technology: *E. coli*, yeast
6 PhD students



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Cultivation technology: animal cells



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Cultivation technology: *Pichia pastoris*

Key references.

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