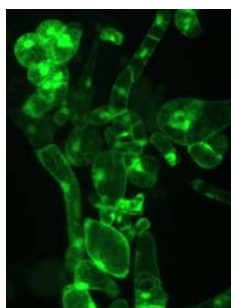


Cultivation of *Helianthus annuus*

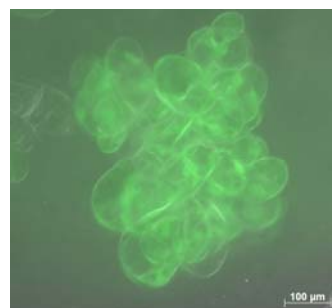
Callus and Suspension cultures for the biotechnological production of α -tocopherol



Callus of *H. annuus*



**Suspension of *H. annuus*, stained with FDA
(green: viable cells; fluorescence microscope)**



Helianthus annuus L. – annual Sunflower:

For engineering, construction and optimisation of processes for the production of several interesting plant secondary metabolites the annual Sunflower (*Helianthus annuus* L.) was chosen as model system [1].

At Chair of Bioprocess Engineering an untransformed cell line is already cultured very successful for some years. Out of that callus a well and stable growing suspension culture was established.

To enhance the yield of the secondary metabolite α -Tocopherol transformation experiments with *Agrobacterium tumefaciens* are in progress. Analysis of the secondary plant substance will be performed with the help of GC/MS.

[1] Pavlov, Werner, Ilieva, Bley: Characteristics of *Helianthus annuus* Plant Cell Culture as a Producer of Immunologically Active Exopolysaccharides, Eng. Life Sci. 5. No. 3, 2005.

[2] Zang, Andrea (2010): HiTec Zang GmbH. Website <http://www.hitec-zang.de/>

Cultivation with *online* monitoring system:

The **R**espiration **A**ctivity **M**onitoring **S**ystem (RAMOS) [2] is used for a fast screening of plant cell suspensions and the optimisation of culture conditions.

This system enables the cultivation of plant cells in shaking flasks with *online* monitoring. With the help of a sensor in each bottleneck, pressure and oxygen partial pressure in the flasks can be measured. Furthermore, an internal calculation provides growth relevant data like oxygen transfer rate OTR or respiratory quotient RQ. Thus, a prediction concerning cell growth is possible.

So far, in this system tests with untransformed cell cultures of *H. annuus* have been examined e.g. by variation of substrate concentration.



RAMOS including 8 shaking flasks for measurement, each with suspension of *H. annuus*



flask for measurement, standard flask (after [2])