Mechanical downstream processing of Single Cell Oils

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During the last years, the third generation of bio fuels has been arousing more and more interest. Under certain conditions some micro organisms: yeasts, algae, fungi and bacteria, can accumulate up to 50% oil (based on dry weight). These so-called 'Single cell oils' (SCO) are well known in this context.

Nowadays, harvesting and recovery of interesting products from microalgae is one of the most problematic areas of algal biofuel production technology. The traditional downstream process, used in the food and feed industry, runs up to more than 50% of the total production cost of Single Cell Oils (SCO). This research is focused on the development of a simple, robust and economical feasible mechanical downstream process set up for the commercial production of SCO. An efficient yield technique to extract the biomass from its growing medium and the disruption of the harvested cells are the main focuses. Two algae model organisms with different properties were selected: *Phaeodactylum tricornutum* and *Nannochloropsis* sp.

In this study crossflow (micro)filtration is investigated as an alternative for the concentration of the fragile cells. Due to its low shear forces it's a more gentle technique than centrifugation which can damage the cells. Tests at lab-/pilotscale were performed with a 0,1m² 0,45µm Hydrosart membrane (Sartorius). As a result of these tests crossflow filtration seems to be a suitable technology to concentrate algae suspensions. At this moment research is done to optimize the cleaning of the membrane cassette to extend the life time and reduce the operating costs. The major costs of this technique are the high energy consumption of the pumps as well as the membrane replacement.