Electroflocculation of Green Microalga Chlorella vulgaris.

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Photoautotrophic microalgae (e.g. *Chlorella vulgaris*) are generally cultivated with quite low harvesting densities. In most of the cultivation systems, the final biomass concentrations vary around 2-3 g/L. Separation of the desired microalgal biomass from the large volumes of cultivation media is energetically highly demanding, as centrifugation is the most common way of separation. One of the possible method used to increase the harvesting densities is electrocoagulation (electroflocculation) process. The method is known and used in the field of industrial waste water treatment. In principle, the sacrificed anode is releasing positively charged metal ions (mostly Al^{3+} or Fe^{3+}), which create in water environment different hydroxo-complexes and work as flocculation agents. The negatively charged particles to be removed are interconnected with the help of cations and form flocs, which can be subsequently easily separated via sedimentation or flotation. The aim of the contribution is to study the electroflocculation efficiency of microalgae *Chlorella vulgaris* in dependence of various operating conditions.

Chlorella vulgaris is well known microalga with wide range of use in human and animal nutrition and other applications. It was estimated that 20-30% of the production costs is the cost of biomass separation from the cultivation medium. As the Chlorella cells are negatively charged, we focused on the pre-concentration of the biomass via electrocoagulation with iron electrodes. We found the electrocoagulation of *Chlorella vulgaris* suspension feasible; the formed flocs could be easily separated by sedimentation or flotation. Flocculation efficiencies above 98% were reachable. From the original biomass density of 1 g/L, sediment density of 15 g/L was obtained in 30 min in 30 cm high column, so the volume to be centrifuged was decreased 15 times. Flotation was much quicker, separation under the same condition lasted 3 minutes and the resulting algae-containing layer had the density of 29 g/L. Influence of cultivation media components, conductivity of the algal suspension, voltage, time of current application and mixing on the flocculation efficiency and iron content in the algal biomass were investigated. It was found, that crucial for the efficiency of electrocoagulation is the total electric charge per volume of algal suspension and cell concentration, regardless of particular voltage and time applied.

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