



Electroporation of Algae Cells

Need:

Efficient method to achieve lysis of algae cells for oil extraction.

Current Methods:

Many methods to extract algae oil are being explored including expeller/press, hexane solvent oil extraction, and super-critical fluid extraction.



Process Features:

- Algal oil more accessible to extraction processes
- Strong electrical field perforates membrane

Eltron's Method:

Eltron will apply electroporation to algae cells to make the oil more accessible to extraction processes. Electroporation, or electropermeabilization, is the application of an electrical potential field to effect the perforation of lipid bilayers membranes of cells. It is frequently used in biochemistry to allow transfection of cells with DNA. Placing a cell in a strong electrical potential field can perforate the membrane by two processes:

- First, the field causes a potential across the membrane. This transmembrane potential can be sufficiently large to cause a perforation as ions inside and outside the cell move to balance charge across the membrane.
- Second, the current passed to achieve the voltage can cause Joule heating, localized at the membrane surface. The heat can cause local melting of the bilayer, weakening it. (Shorter, weaker pulses produce temporary holes that heal within minutes.)

These conditions are used for transfection of live cells. If pulses are of sufficient magnitude and duration, they can lead to lysing of the cell.

Stage of Development:

Eltron has designed and built a prototype capable of applying sufficient voltage to a container of algae paste to induce lysing. The system was designed to safely provide the significant current necessary to achieve a high voltage field in a highly conductive marine algae sample. Our prototype system can currently process approximately four batches of 0.1 L of algae paste in one hour.

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