Industrial Algae Cultivation

through real-time monitoring of bioreactors

Q.ANT

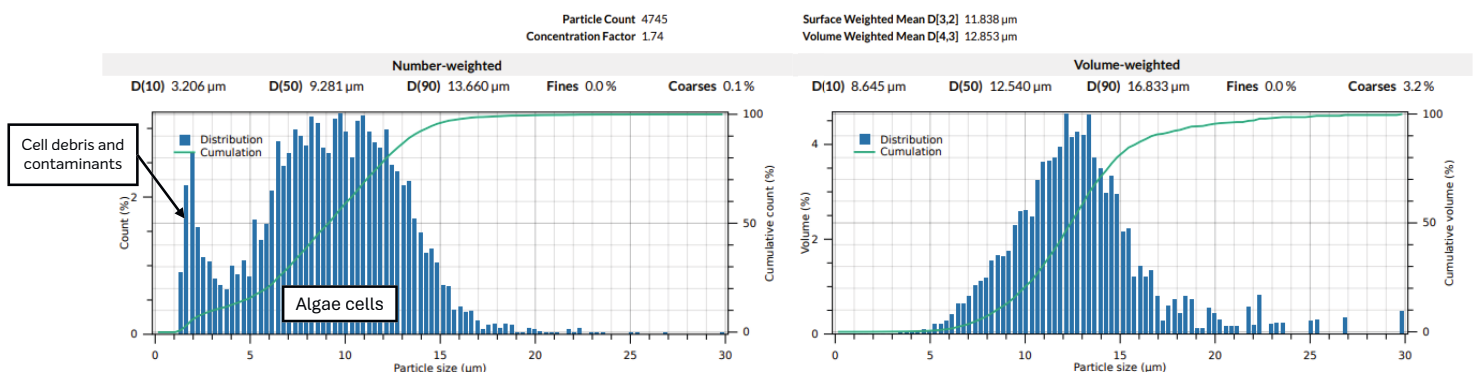## Algae have the potential to change the world

Renewable resources have become one of the most important factors to face today's challenges of climate change and increasing scarcity of raw materials. As a source of renewable raw materials, industrialized algae cultivation moves into focus of various industries like food, chemicals, bioenergy or pharmaceuticals. Be it algae as food, as bio fuels or as bio plastics: Increasing the efficiency of industrial algae cultivation is crucial in order to make algae products competitive on the market.

Real-time bioreactor monitoring for industrial algae cultivation

When cultivating algae, population vitality is crucial. However, currently used optical density sensors provide limited information about vital biomass or individual cell characterization. The Q.ANT Particle Sensor enables the real-time analysis of single particle size, size distributions and estimation for velocity and count for particles ranging from 2 to 700 microns for real-time monitoring of algae cultivation in bioreactors. By providing an instant evaluation of growth phases and key cellular attributes like size, cell debris, agglomeration factor or contamination, the sensor's analysis provides real-time insights into the algae culture, enhancing the understanding of their state.

Size distributions of a real-time algae measurement

Particle Count 4745
Concentration Factor 1.74

Surface Weighted Mean D[3,2] 11.838 µm
Volume Weighted Mean D[4,3] 12.853 µm

Number-weighted

| D(10) 3.206 µm | D(50) 9.281 µm | D(90) 13.660 µm | Fines 0.0 % | Coarses 0.1 % |

Volume-weighted

| D(10) 8.645 µm | D(50) 12.540 µm | D(90) 16.833 µm | Fines 0.0 % | Coarses 3.2 % |

# Solving challenges in industrial algae cultivation

The Q.ANT Particle Sensor addresses common challenges in industrial algae cultivation.

Analysis of the growth phase of the cultivation

By monitoring the relative cell count over time, the growth phase of the algae cultivation in a bioreactor can be determined. This helps to run bioreactors at the optimal operating point, to identify harvest time or optimize fed-batch processes.
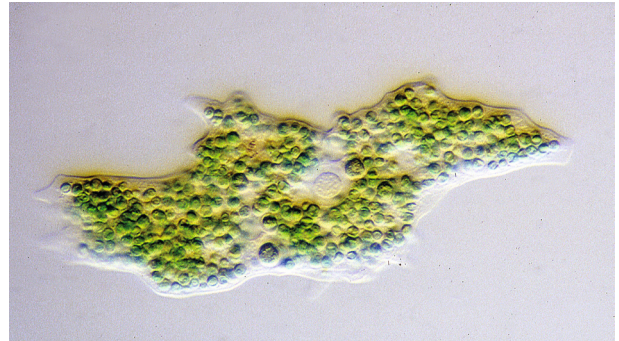
Analysis of contaminations in bioreactors

The determination of contamination levels and its temporal development in photobioreactors for example bacterial or ciliates growth can be determined.
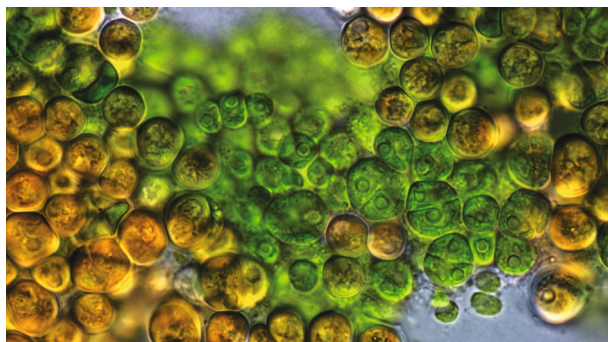
Analysis of algae quality in the cultivation

The measurement provides profound insights into the quality of the algae culture by detecting individual particle size, which allows the determination of key attributes like cell debris, growth phase, agglomeration factor and contamination.

Optimization of industrial algae cultivation

Monitoring the algae cultivation in real-time enables increasing process productivity as well as the quality of the algae culture. The resulting avoidance of manual lab work and faulty production leads to an optimized industrial algae cultivation.