PROJECT OFFER

3D Phase Contrast Microscopy for Flow Cytometry

We develop hardware and software to track and characterize individual objects like bacteria, emulsion droplets or microparticles in 3D. The technology makes it possible to label-free distinguish microorganisms and to analyze their movements and interactions.

BACKGROUND

Phase contrast microscopy is a much-used label-free technique to visualize individual cells in microbiological samples, but the depth of focus and throughput are limited. On the other hand, traditional flow cytometric analysis of cells based on fluorescence labeling and fixed-angle scattering intensity is used to statistically classify and sort cells, but provides no information on cell movement and only limited information on cell morphology.

TECHNOLOGY

We have developed a technique that combines the capabilities of both, and more, in a compact format. Using 3-D phase contrast holography, based on a simple optical setup and software to calculate the full light field throughout a microfluidic channel, we quantify throughout the sample how much light was scattered. This allows us to locate individual organisms, quantify the amount of scattering related to their dry mass as well as their shape and orientation.

Since all this information is obtained from a single snapshot, we can further track the individuals to characterize dynamic properties such as diffusion, sedimentation and propulsion at high time as well as spatial resolution. By considering the positions during accelerations we can moreover measure interactions with different substrates or between individuals. By analyzing recorded movies, we can obtain population-wide statistics on these meaningful properties.

Since different cells, e.g. bacteria, can be recognized by their morphology, internal structure and movement, the method could also be used for classification and possibly sorting of microorganisms.

OUR OFFER

We seek partners to develop applications in instrumentation for biology, biotechnology and medicine using 3-D Phase Contrast Flow Cytometry that might include the option to sort on given characteristics, including non-labeled sub-micron objects.

EXPERTS

Univ. Ass. Dipl.-Ing. Dr. Petrus D. J. van Oostrum

Univ. Prof. Dr. Erik Reimhult

Dr. Anders Lundgren

AVAILABLE FOR

Joint Research Project

Contract Research

National and international funding calls

DEVELOPMENT STATUS

TRL 3-5 (depending on application)

KEYWORDS

- 3D Microscopy
- Cytometry
- Population based analysis
- High throughput
- High time resolution

CONTACT

acib GmbH
Petersgasse 14
8010 Graz
tel: + 43 316 873 9316
e-mail: bd@acib.at
www.acib.at