Thursday, October 11
Oral Session 9
08:30–10:30

09:50–10:10

FLUOSIEVE: TOWARDS FIELD APPLICATION OF A HIGH-THROUGHPUT FLUORESCENCE IMAGING FLOW CYTOMETER FOR MARINE PHYTOPLANKTON ANALYSIS

High-throughput quantitation and characterization of phytoplankton in natural seawater is of fundamental significance for ocean ecology and environment study. Imaging flow cytometry (IFC) can extract statistical information by analyzing numerous phytoplankton images captured while they flow through an optical interrogation area, thanks to its high-throughput capability in acquiring phytoplankton images with cellular resolution. However, taking fast yet accurate measurement of diverse natural phytoplankton with extreme heterogeneity remains challenging for current IFC instruments. Some fundamental issues such as lack of sensitivity and resolution for detecting picophytoplankton, compromises between imaging throughput and imaging quality due to motion/defocusing blurring for analyzing larger microphytoplankton, still limited their practical application in terms of measurement accuracy and throughput. Combining laser-sheet excitation with "flow-through" detection, a new light-sheet fluorescence IFC (LSF-IFC) has been devised recently. This new IFC has demonstrated several advantages in laboratory experiments over shortcomings associated with traditional IFCs for phytoplankton analysis. Its universal usage of single objective lens, out-of-focus noise suppression, excitation power density concentration and more in-focus photons integration all together facilitate great enhancement in phytoplankton image resolution, signal-to-noise and throughput. Based on previous progress achieved indoors, the technology is further developed into field instrument, named FluoSieve, recently. Besides routine usage in laboratory setting, FluoSieve was exclusively designed to work for field environments such as coastal station, onboard research vessel, and et al. We will report the development and preliminary measurements of this new instrument. It is expected FluoSieve can be promoted towards more field applications that demand automated phytoplankton analysis.

Jianping Li, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, jp.li@siat.ac.cn
Mark Luk, Xcube Technology Ltd, marklukhk@gmail.com
Honglong Zhang, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, hl.zhang@siat.ac.cn
Tao Chen, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, tao.chen@siat.ac.cn
Peng Liu, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, peng.liu@siat.ac.cn
Qinmu Peng, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, pengqinmu@hust.edu.cn