FLOURESCENCE MICROSCOPY INSTRUMENTATION SIMPLIFIED USING NOVEL MULTI-LINE LASERS

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ABSTRACT

Conventional fluorescence-based bio-instrumentation equipment typically uses multiple individual lasers combined through optical elements into one beam or an optical fiber. The systems can become bulky, costly to manufacture, and challenging to keep aligned. An extremely compact, permanently aligned, and service-free multi-line laser device can reduce the size and cost of these systems for fluorescence-based research. Removing the complexity of integrating individual lasers with a multi-line solution makes the techniques more cost-efficient, user-friendly, and accessible for all levels of researchers.

Here we demonstrate how multi-line lasers are integrated into fluorescence-based instrumentation to simplify experiments without compromising the quality of the results. Integrated electronics, software interfacing, and individual control of each laser-line allow for full flexibility to tailor the laser for the exact experimental needs. Applications include fluorescence microscopy (SIM, TIRF, STED), light sheet microscopy, confocal microscopy, flow cytometry, and combined techniques in research laboratory environments [1]. In this work, we will show that multi-line laser solutions are an attractive alternative to laser combiners to simplify fluorescence imaging instrumentation and furthermore aid in the process of commercialization for new, cutting-edge imaging systems for clinical use [2].

The Cobolt Skyra™ multi-line laser is an extremely compact laser device (14.4 cm x 7.0 cm x 3.8 cm) with up to 4 laser lines in one permanently aligned output beam. All optical elements are assembled onto one ultra-stable platform, using patented HTCure™ technology developed by Cobolt, with high precision and permanent alignment. In addition, the multi-line laser can be customized with any combination of more than 14 colors, ranging from 405nm to 660nm, as well as fiber coupling.

REFERENCES:

[1] E.Illy and H. Karlsson, *BioOptics World*, Highly stable multi-line lasers for next-generation imaging. Oct 2018.
[2] Glaser, A. K. et al. Light-sheet microscopy for slide-free non-destructive pathology of large clinical specimens. Nat. Biomed. Eng. 1, 0084 (2017).