

Cobolt Zouk™ 355 nm: a true CW compact DPSS laser for fluorescence microscopy and flow cytometry

While compact solid-state laser alternatives meeting the required specifications for laser induced fluorescence (LIF) experiments are now available at wavelengths covering most of the visible spectrum, there has been a lack of suitable sources in the UV part of the spectrum.

Lasers in the UV are attractive for excitation of fluorophores such as Hoechst Blue, DAPI and Indo-1 for use in DNA analysis and calcium imaging applications. A true CW, compact DPSS laser in the 350-360nm region would therefore be an interesting alternative to the currently available UV or near-UV laser sources, especially when considering adding UV excitation capability to bench-top instruments targeting clinical applications

Some applications examples

Calcium Research – Indo-1:

TIRF microscopy measurements of the cytoplasmic Ca²⁺ concentration beneath the plasma membrane of an individual insulin-secreting β-cell stimulated with glucose. The top panel shows 405 and 480 nm fluorescence emission images of a cluster of β-cells loaded with Indo-1 and excited with the CW 355 nm laser. The middle panel shows a time-lapse fluorescence recording from the cell encircled in the top left images. Elevation of the glucose concentration from 3 to 11 mM triggers oscillations of the sub-membrane Ca²⁺ concentration (Co Dr Anders Tengholm, Medical Cell Biology, Uppsala University Sweden).

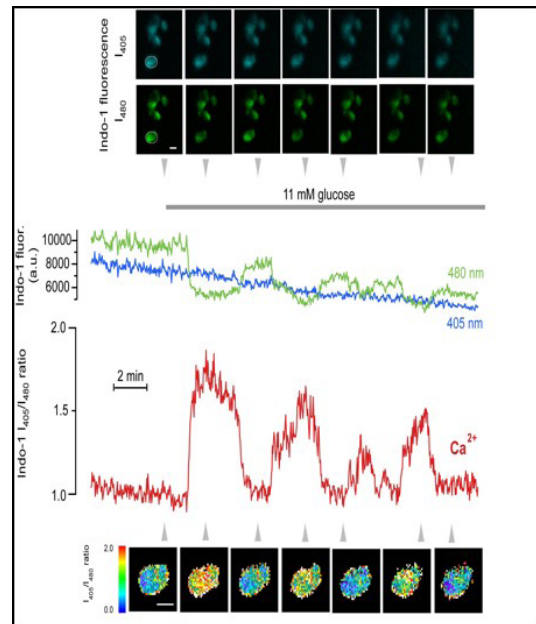


Figure 2. Calcium Research – Indo-1 (Co Dr Anders Tengholm, Medical Cell Biology, Uppsala University Sweden).

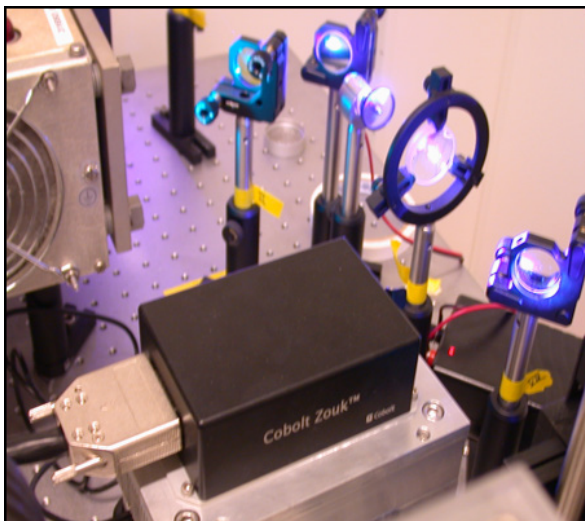


Figure 1. Cobolt Zouk™ 355 nm applied in Calcium research (Co Dr Anders Tengholm, Medical Cell Biology, Uppsala University Sweden).

Stem Cell research:

An example of Side populations using Hoechst 33342 and Cobolt Zouk™ 20 mW in mouse bone marrow (Co B.Telford NIH, USA)

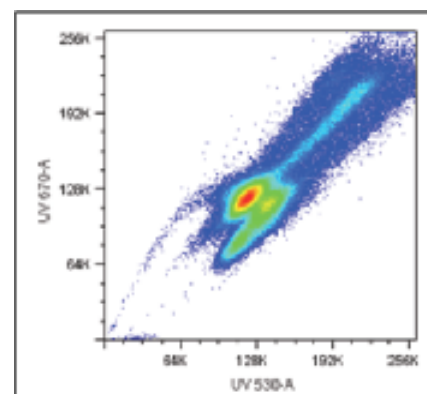


Figure 3. Stem Cell side population in mouse bone marrow (Courtesy of B.Telford NIH, USA).

Uncaging:

UV uncaging of Ca²⁺ in insulin-secreting β -cells. The cells were loaded with NP-EGTA and the fluorescent Ca²⁺ indicator Fluo-4 and subsequently exposed to flashes of UV light (arrows) of gradually increasing duration using the 355 nm laser (Co Dr Anders Tengholm, Medical Cell Biology, Uppsala University Sweden).

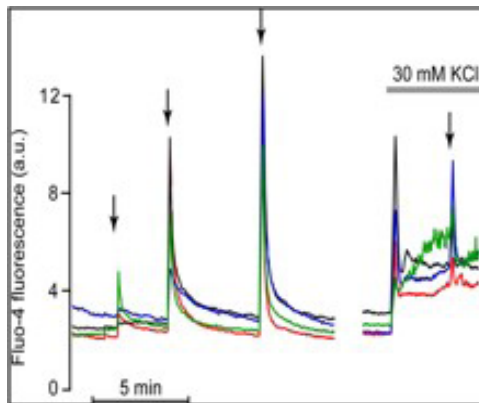


Figure 4. Uncaging (Co Dr Anders Tengholm, Medical Cell Biology, Uppsala University Sweden).

Typical noise performance of the Cobolt Zouk™ while temperature cycling from 20-50°C shows peak to peak noise <1% and rms noise <0.1%. On the right the power stability is also shown over a period of 500 hrs.

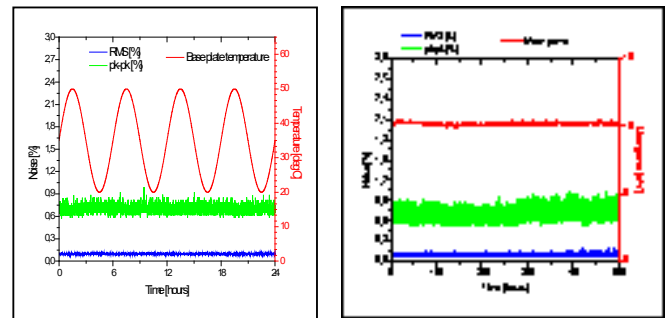


Figure 6. Typical noise performance of the Cobolt Zouk™

The Cobolt Zouk™

The Cobolt Zouk™ is a compact single-frequency DPSS laser offering 20 mW CW at precisely 355 nm from a hermetically sealed package, with very low intensity noise, and in a high quality TEM₀₀-mode and low-divergent beam.



Figure 5. Cobolt Zouk™ 355 nm