

Application

Raman spectroscopy in VIS/NIR

of a rotating sample excited by a CW laser with external modulator

(see proof-of principle setup scheme in paper DOI: 10.1039/C9NA00487D *open access*)

Conditions

- **Sample should be pumped only during the time it crosses the laser beam** (600 – 60 000rpm)
 - repetition rate 10Hz – 1kHz (1 – 100ms period) changing during experiment
 - duty cycle 0,7% or larger (constant, independent of rep. rate for a given sample)
 - pulse width 7µs – ~1ms, determined by rep. rate and duty cycle
- **External modulation**
 - fast binary digital (ON/OFF) with a high extinction ratio
 - slow power control, at least one of following types (in priority order)
 - by computer (USB, RS232, etc.)
 - analog modulation
 - manual

Requirements

- **Laser wavelength** (+/- 2 nm): 405, 532, 638, and 785 nm (DPSS or VBG-diode, linearly polarized)
main operation wavelengths - 405 and 638nm, next 532nm, 785nm – only a useful future option
- **Insertion losses:** ≤ 1dB (≥ 80% diffraction efficiency)
- **Polychromatic operation** (*quote all possible configurations!*):
individual AOM for each laser
and alternatives, e.g.,
 - # A **UV-Vis-NIR AOM** for 405 / 532 / 638 / 785 (a bit worse performance for 785nm)
 - # B **UV-Vis AOM** for 405 / 532 / 638 + **NIR AOM** for 785
 - # C **UV AOM** for 405 + **Vis-NIR AOM** for 532 / 638 / 785
 - # D **UV-Vis AOM** for 405 / 532 + **Vis-NIR AOM** for 638 / 785
 - # E **UV AOM** for 405 + **Vis AOM** for 532 / 638 + **NIR AOM** for 785

AOTF are usually a bit too slow
PCAOM can be used in two possible configurations

 - common - combined coaxial input and output beams (Fig.1)
 - may be possible too - separated input but combined coaxial output beams – a kind of backward polychromatic deflector (preferred option to simultaneously directly combine individual laser beams) (Fig.2)
- **Digital modulation** (common for all wavelengths)
 - external trigger TTL
 - rise/fall times ≤ 1µs (10-90%)
 - extinction ratio ≥ 1000:1 (30dB)
 - trigger gate (*option*) fast, ~10µs interlock
- **Laser power control** (individual for each wavelengths)
 - power control range 1-100%, still acceptable option 10-100%
 - computer control USB interface (RS232 – possible option)
 - analog modulation bandwidth ≥ 1Hz
 - analog modulation control voltage 0-1V, or 0-5V, or 0-10V (either one range)
- **Accuracy, induced noise, stability** ≤ 1%
- **Laser beam diameter** (TEM₀₀) ~1mm, 1,5mm max
focusing can be an option to reduce switching time but only without deterioration of insertion losses / diffraction efficiency

- **Laser power** $\leq 200\text{mW}$, typ. 100mW each (CW)

Notes:

- The supplier should be an authorized sales and service representative of the original manufacturer.
- Warranty: At least one year on the complete system.
- Specify the total price including university / research discounts and sconto discount
- Comments on unique features different from competitor products would be useful

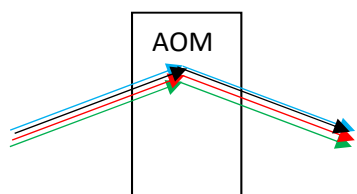


Fig. 1

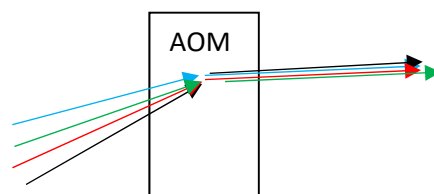


Fig.2