– Supplementary Information –

Miniaturisation of Raman Spectroscopy Systems: From Benchtop to Backpocket

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Feature	CCD Detectors	CMOS Detectors
Sensitivity	High, especially for low-light	High (now comparable to CCDs)
Size	Compact, but larger than CMOS	Smaller, highly integrated
Noise	Lower (cooled systems)	Improved with BSI and noise reduction
Power Consumption	Higher	Lower, more efficient
Speed	Moderate	High
Cost	Higher	Lower

Table S1. Comparison of Charge-Coupled Device (CCD) and Complementary Metal Oxide Semiconductor (CMOS) sensors. BSI=backside illumination [1]

λ (nm)	Class	Spec. range	Spec. Res. FWHM	Mass (kg)	Notes 1	Notes 2
830 (450 mW)	3B	350-2000cm-1	<14cm-1 average	1.8	Medical apps of SORS 'interesting'	Defocussed to probe maximal area / offset detector for SORS. 257mm depth.
785 & 852 'DuoLaser' two laser system.	1M	300-3200cm-1	Typically <1cm-1 (300-1900cm-1)	'Handheld'		SSE for flu rejection. This uses variable temperature to remove background.
785 / 1064	enclosed	? 3000cm-1 +	1.5-4cm-1	benchtop	confocal	Can incorporate FT-Raman @ 1064nm if desired
785nm	Glasses necessary (provided)	200-2750cm-1	4cm-1	2.5kg This is a small Raman spectrometer with fibre optic attachment that inc. optics.	Variable performance comes down to different optics and cooling options.	
532nm version	50mw-70mW	200-4500cm-1	9cm-1 and under			
785 (350mW)		250-2875cm-1	8-10.5cm-1	0.9kg Handheld	NA=0.33	Solo software. Measurement Accessories Vial holder, universal tablet holder, cuvette holder Qualitative/semi-quant
785 (450mW)	Probes 3B laser	100- 3250cm-1	6.5cm-1 mean	benchtop H: 7.7 cm W: 25 cm D: 25 cm		Fiber BallProbe® probe Raman suite softeare Quantiative Raman
785 (<100mW)	3B	400-2300cm-1	0.6nm 8-10cm-1	0.7kg	Library of illicit materials.	
785 (340mW)	fibre-coupled	150-2800cm-1	<6cm-1@912nm	9kg 'Portable Raman')	-25oC cooled CCD	Video uscope w/ xyz stage
785 (340mW)	fibre-coupled	65-2800cm-1	3.5cm-1@912nm	5kg ('Portable Raman')	-2oC cooled CCD	Algorithm for flu rej. 'Algorithm might not work so well at 532nm w/ lot of flu.' Orbital raster scanning for averaging. 1064nm 532nm lasers also available
785 (300mW)		176- 2900cm-1		1kg		Libraries: Narcotics, Explosives*, Pharmaceutical Drugs, Cutting Agents, Precursors, Toxic & Common Chemicals, and More 1064nm versions also available.

Table S2. Comparison of selected portable/carriable Raman systems. L-R: Vendor, Model name, Laser Wavelength, Laser class (or safety information otherwise), Spectral range (wavenumbers), Spectral Resolution (wavenumbers or nanometres), Mass, Note/Other details. FWHM=full width half maximum. Each colour represents a different Raman vendor.

References

[1] OpenAI ChatGPT: Scholar AI GPT [Large language model]. https://chat.openai.com