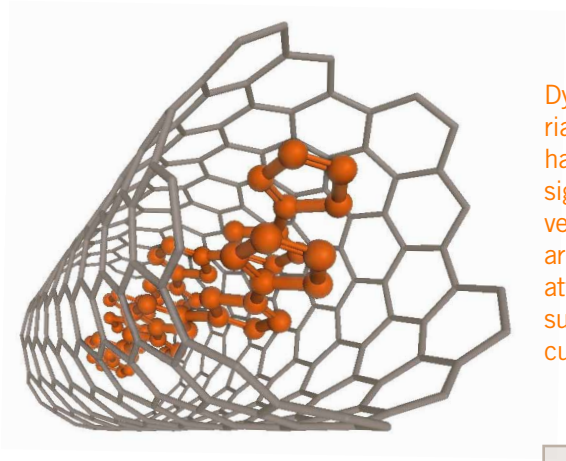
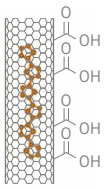
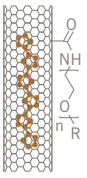
RAMAN LABELS



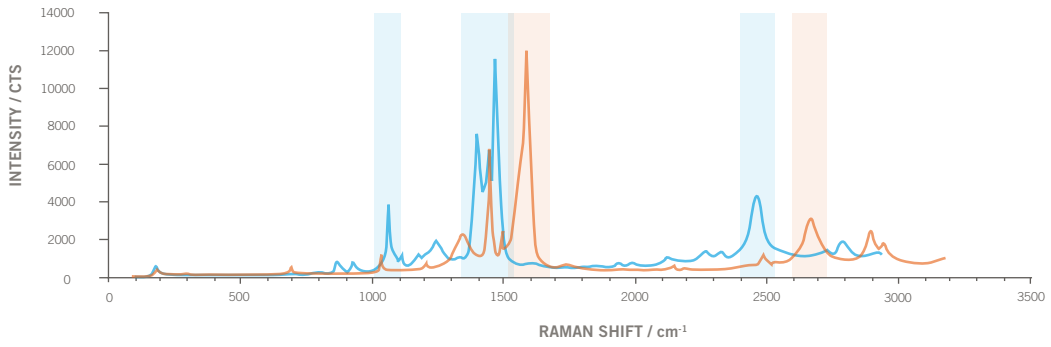
Dyes encapsulated in carbon nanotubes (dyes@CNT) are the newest nanomaterial offered by Photon Nano. Developed at Université de Montréal, these labels have exceptional Raman scattering properties. Each dye has a unique Raman signature, a Raman cross-section high enough to allow single object detection, very low photoluminescence and negligible photobleaching. Two different dyes are available: 6T@CNT and bcar@CNT both with different chemical groups attached to the side wall for easy functionalization. These nanoparticles are best suited as Raman contrast agents or as Raman labels for proteins and biomolecules. They allow unequivocal co-localization.

		Dimension (dia x L)	CNT content	Metal content from TGA*	1st oxidation peak	2nd oxidation peak	Surface functionalization
Dyes@CNT – COOH		0.9 – 1.5 nm x 0.1 – 3 µm	68 ± 5%	19 ± 2%	N/A	656 ± 6°C (6T) 620 ± 15°C (bcar)	1-6 atomic % COOH
Dyes@CNT-PEG-OH		0.9 – 1.5 nm x 0.1 – 3 µm	68 ± 5%	19 ± 2%	318 ± 2°C	560 ± 15°C	R = 0.1% atomic PEG-OH PEG MW : 3000 g/mol
Dyes@CNT-PEG-NH_2							R = 0.2% atomic PEG-NH_2 PEG MW : 1500 g/mol
Dyes@CNT PEG-Biot							R = 0.1% atomic PEG-Biot PEG MW : 2400, 5300 g/mol

* Higher grades available.

** 2 labels available.

RAMAN SPECTROSCOPY AT 514 nm OF dyes@CNT-R



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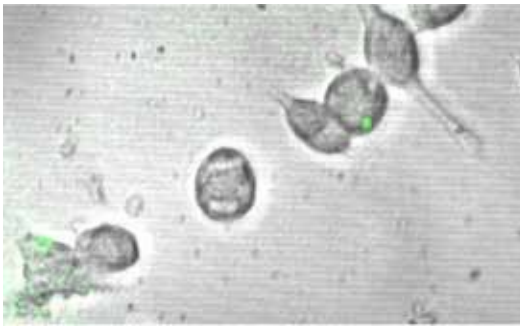
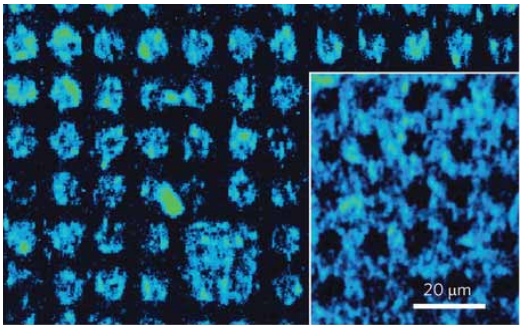
APPLICATION NOTES

CELLULAR LABELLING



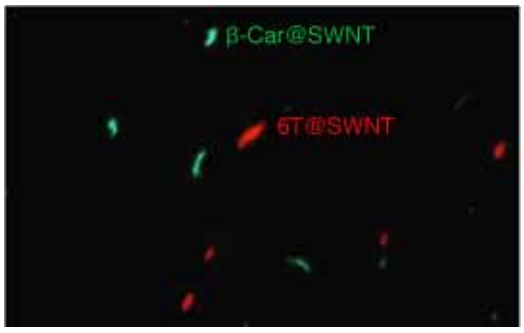
Among other applications, Raman labels can be used to target cells. Often, to characterize and identify a cell with certainty, many targeting agents are necessary. The Raman labels offer the possibility to easily mark more than 5 targets unequivocally simultaneously. Furthermore, their surrounding PEG groups render them non-toxic to many cell lines. The image shown here is a superimposed white light image over the Raman image of bcar@CNT where N9 microglia were incubated with Raman labels, which penetrated the cell with non-specific interactions. The working concentrations did not cause any toxicity to the cells.

PROTEIN DETECTION



In the field of proteomics, protein microarrays and novel detection platforms are gaining popularity because of their potential in HTS and much improved sensitivities. Raman labels can be used in protein arrays as novel labels for systems that require very robust labels or high multiplexing properties. The probes are versatile and can easily be functionalized with groups such as NH_2, COOH, SH, maleimide, biotin and PEG which makes them ready for antibody conjugation. Here, Raman label-PEG-Biot are captured by an array of patterned streptavidin on the surface demonstrating the specificity of the Raman label.

SINGLE OBJECT SENSITIVITY & MULTIPLEXING



Currently, observing single objects is crucial to understanding certain phenomena at the nanoscale. Detecting and studying single objects is now possible using the intense Raman signal of the Raman labels. Two different probes were deposited on a surface and their hyperspectral response was recorded. Their unique signature allows for unequivocal identification of each probe. Since the Raman signal is not subject to photobleaching or energy transfer, it is possible to identify and quantify overlapping probes.

E. Gaufrès et al., Giant Raman scattering from J-aggregated dyes inside carbon nanotubes for multispectral imaging, Nature Photonics, **2014**, 8, 72-78.

N. Cottenye et al.,Raman tags derived from dyes encapsulated inside carbon nanotubes for Raman imaging of biological samples, Physica Status Solidi A, **2014**, 211 2790-2794.

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