



# ALBA: ON-CHIP BRILLOUIN SPECTROMETER

## Spectroscopy solutions for Mechanobiology

ALBA is the first worldwide **fully integrated** Brillouin spectrometer on a silicon photonics chip. The extreme miniaturization requires virtually **no extra space** in lab environments, while the complete absence of physical optical components makes this device intrinsically **alignment-free** without compromising speed, spectral resolution and dynamic range, ensuring **rapid spectral acquisition**. With optical connectivity secured by a standard single-mode SM PM fibre, ALBA is **fully compatible** and **easily integrated** in conventional spectroscopy setups and microscopes, extending their capabilities with all-optical, label-free Brillouin elastography for 3D mechanical analysis.



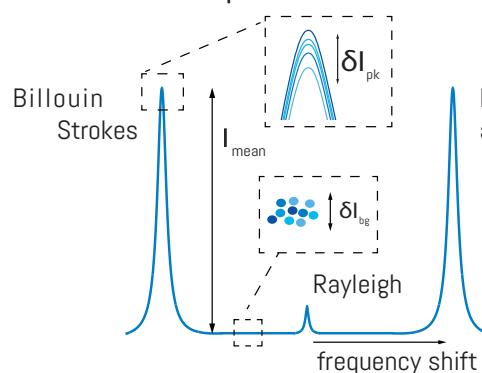
### WHY CHOOSE ALBA?

	Fully integrated on a chip		sub-GHz spectral resolution		High dynamic range		Temperature stabilized
	Alignment-free and plug & play		Fast spectral acquisition		Compatible with standard microscopes		Miniaturized and portable

# KEY SPECIFICATIONS

Operating wavelengths	532 nm; 660 nm
Spectral resolution	<0.6 GHz (<0.02 cm <sup>-1</sup> )
Dynamic range	>90 dB
Rayleigh background suppression	>60 dB
Free spectral range	30 GHz (1 cm <sup>-1</sup> )
Signal-to-Noise Ratio (SNR)* @15mW, 100ms in water	>10
Signal-to-Background Ratio (SBR)** @15mW, 100ms in water	>50
Insertion loss (typical)	<3 dB
Optical input	SM PM fibre
Device dimensions	12 x 14 x 10 cm <sup>3</sup>
Weight	2.3 kg
Operating temperature	-10°C / +40°C
PC connection	USB-C

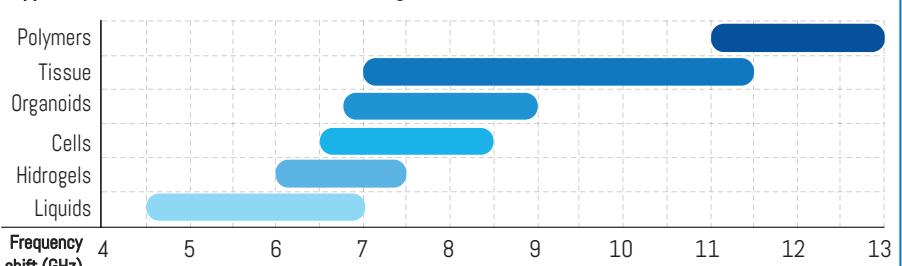
## Schematic Brillouin spectrum



$$*S\ N\ R = \frac{I_{\text{mean}}}{\delta I_{p\ k}}$$

$$**S\ B\ R = \frac{I_{\text{mean}}}{\delta I_{b\ g}}$$

## Typical Brillouin shift of different biological materials (lambda = 660 nm, theta = 180°)



# BRILLOUIN SPECTROSCOPY

Brillouin spectroscopy is an all-optical elastography method used to explore the mechanical properties of materials by probing their spontaneous acoustic waves. It provides precise information about elasticity, viscosity, and phase transitions at micron-scale spatial resolution.

Non-contact	3D mechanical mapping
Label-free	Living cells and tissues
Subcellular resolution	

Given the intrinsic complexity in detecting the weak Brillouin spectral peaks arising in close proximity to the laser wavelength, standard approaches require the use of several free-space optical components fabricated with tight tolerances and distributed across large architectures, posing intrinsic limitations as a consequence of mechanical and thermal drifts.

Specto Photonics has redefined this concept by removing all free-space optical parts and developing **the first worldwide fully-integrated on-chip Brillouin spectrometer: ALBA!**

**Want to know more?** Read our review paper → R. Prevedel et al., Nature Methods 16 (10), 969-977 (2019).

# BIOLOGY APPLICATIONS

Cellular and tissue biomechanics drive development, differentiation and disease progression. Yet most mechanical measurement tools are complex, low-resolution, and incompatible with living organisms.

Living cells	Tissue engineering & biomaterials
Organoids	Tumor microenvironment & extracellular matrix
Tissue mechanics in health & disease/physiology vs pathology	

ALBA will ease these applications with a **fully integrated, ultra-compact and alignment-free** platform enabling rapid 3D mechanical imaging

