# Cutting-edge technology, Australian made

Cylite is an Australian medical technology company developing the world-first Hyperparallel OCT<sup>™</sup> (HP-OCT<sup>™</sup>), a truly unique approach to OCT technology invented and patented by brothers Steve and Grant Frisken in 2013. Nine years and 36 patents across 11 countries later, Cylite has grown to a company of over 80 people and occupies a purpose-built state-of-the-art facility in the eastern Melbourne suburb of Mulgrave.

#### WHAT'S DIFFERENT ABOUT HYPERPARALLEL OCT?

In 1991, optical coherence tomography (OCT) was first reported in the literature by Huang and colleagues. Since then, the technology has evolved significantly and has achieved widespread adoption worldwide. Despite its unquestionable importance and advantages, traditional OCT remains based upon single scanning beam technology, which means there are inherent issues with overcoming eye motion artefacts and therefore difficulty in creating true 3D volumetric images.

Hyperparallel OCT overcomes this limitation by utilising its patented "snapshot" capture method. This method is made possible by the HP-OCT's use of free-space optics rather than fibre-based optics, which allows the placement of a micro lens array in the path of the OCT beam. This micro lens array consists of 1,008 lenslets that split the single beam into 1,008 individual, parallel beamlets, which simultaneously capture an entire frame of information, effectively freezing any eye movement for that frame. By scanning multiple frames in quick succession, the HP-OCT achieves scanning speeds of 302,400 scans per



second. Each frame is then registered to the initial one, thereby creating rich and dense 3D volumetric images while at the same time neutralising eye motion errors.

When scanning the anterior segment, the HP-OCT produces a 16.8mm x 9.6mm scan which is 11mm deep. This enables not only a true volumetric image of the entire anterior segment, but also generates important biometric parameters and corneal topography maps.

Biometry parameters include axial length, flat K, steep K, central corneal thickness, anterior chamber depth, lens thickness,





white-to-white and pupil diameter, which can be utilised for applications such as comprehensive myopia management.

The same scan also produces a suite of corneal topography maps of the anterior and posterior cornea, as well as pachymetry and epithelial thickness maps, which can be used for highly accurate contact lens fitting, including scleral lenses and orthokeratology. It is noteworthy that being based on OCT rather than Placido disc technology, the corneal topography maps are tear film independent and therefore unaffected by dry eye.

Alternatively, when scanning the retina, the HP-OCT produces a wide 8.4mm x 4.8mm image with a scan depth of 8.3mm. As with the anterior scan, the retina scan is also a true 3D volumetric scan that can be sliced horizontally, vertically or radially without the loss of scan quality in any direction.

#### LOCALLY DESIGNED AND MANUFACTURED

Not only was the technology invented and designed in Australia, it is entirely

manufactured here. Cylite is proud of its local origins, its contribution to the local economy and

its status as a source of employment in the local medical technology space. By utilising an agile approach to research and development, the company continues to develop cutting-edge technology to compete with global manufacturing giants in the Unites States, Europe and Asia.

## **ONF DFVICF** TO REPLACE MANY

Current ocular diagnostic practice often requires the patient to be scanned on multiple instruments to provide the necessary measurements and imaging data. This can include anterior eye imager, corneal topographer, biometer and OCT. Once complete, the results need to be combined and interpreted.

HP-OCT integrates multiple clinical functionalities into a single space-saving instrument, potentially performing the functions of four or more different instruments. Not only does this improve efficiency and workflow, it minimises

Top: Biometry report, including axial length, generated by a single scan. Above: Epithelial thickness map

Test, Test ···

Biometry 44.2D @ 5.5° 44.84D @ 95.5° 22.668mm 423um 2 773mm 4.485mm

11.81mm 2.88mm

inconsistencies, reduces equipment footprint, simplifies maintenance and reduces overall costs.

### PATIENT EXPERIENCE

Even with a detailed explanation by an eyecare professional, traditional OCT images can sometimes be difficult for patients to understand or relate to. By presenting 3D images that are true to life and more relatable, patients are better able to understand what they see. This helps to improve patient education and engagement, with the aim to improve patient compliance and the overall patient experience.

Cylite will be presenting the HP-OCT at a number of conferences in 2023 and is looking forward to showing off its home-grown capabilities to eyecare professionals locally and around the globe.

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