

ASX RELEASE

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## IMEC COLLABORATION UPDATE

4DS Memory Limited (ASX:4DS) (**4DS** or the **Company**) is pleased to provide an update on its collaboration with imec, its development partner.

In late January 2019, the Company reported that imec had successfully manufactured functional 300mm wafers. These wafers have since been relocated to 4DS's facilities in Silicon Valley where they have undergone extensive analysis.

The Company is now pleased to report it has successfully completed the analysis of these wafers.

imec produced 23 testable 300mm wafers, with minor changes in process conditions for each wafer so as to identify the impact of such changes on the desired memory characteristics for Storage Class Memory. Wafer "D17" demonstrated the best characteristics with respect to endurance and retention – two core characteristics for Storage Class Memory on which the testing and analysis has been focussed.

- **Endurance analysis has shown that the Company can cycle its Interface Switching ReRAM memory cells into the millions of cycles, a first for the Company; and**
- **Retention analysis has shown the best retention results the Company has been able to produce outside of its own facilities.**

This is a significant achievement for the Company as it represents the first time it has been able to replicate and improve certain characteristics on the same multi-million dollar state-of-the-art production equipment used by high volume/high density manufacturers of memory.

The details of the analysis remain confidential to the Company and imec under the terms of the collaboration agreement.

Importantly, during this most recent manufacturing process 4DS and imec obtained invaluable data which will now lead to faster refinement and manufacturing iterations. The next iteration is expected to produce wafers that will be available for analysis during Q2 2019, barring any unforeseen equipment issues.

Between now and the commencement of the manufacturing of the next lot of wafers, the Company will continue to analyse 300mm wafer D17 in order to further refine and optimise the desired memory characteristics. In addition, the Company will analyse a number of other 300mm wafers to better understand why they displayed variations in certain characteristics (with reference to the different process conditions that were used in relation to each wafer) which is equally as important to provide crucial information for the next iteration.

Chief Executive Officer and Managing Director, Dr Guido Arnout, commented "This is the first time our Interface Switching ReRAM cell architecture for Storage Class Memory has been manufactured at any 300mm production facility and, as anticipated, imec's 300mm state-of-the-art equipment and experience resulted in highly consistent cell behaviour."

"This is a major step forward and we are very pleased with the initial endurance and retention measurements. Manufacturing wafers over a range of conditions is instrumental for the continuous improvement of processes required to meet or exceed the endurance and retention goals for our target market – Storage Class Memory."

**ENDS**

## Contact information

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## About 4DS

4DS Memory Limited (ASX: 4DS), with facilities located in Silicon Valley, is a semiconductor development company of non-volatile memory technology, pioneering Interface Switching ReRAM (Non-Filamentary ReRAM), for next generation gigabyte Storage Class Memory. Established in 2007, 4DS owns a patented IP portfolio, comprising 20 granted US patents and 3 patents pending, which has been developed in-house to create high density Storage Class Memory. 4DS has a joint development agreement with Western Digital subsidiary HGST, a global storage leader, which accelerates the evolution of 4DS' technology. 4DS also collaborates with imec, the world's #1 independent semiconductor development institute.

For more information, please visit [www.4dsmemory.com](http://www.4dsmemory.com).

## About imec

imec is the world-leading research and innovation hub in nanoelectronics and digital technologies. The combination of our widely acclaimed leadership in microchip technology and profound software and ICT expertise is what makes us unique. By leveraging our world-class infrastructure and local and global ecosystem of partners across a multitude of industries, we create ground breaking innovation in application domains such as healthcare, smart cities and mobility, logistics and manufacturing, energy and education.

As a trusted partner for companies, start-ups and universities we bring together close to 3,500 brilliant minds from over 75 nationalities. Imec is headquartered in Leuven, Belgium and also has distributed R&D groups at a number of Flemish universities, in the Netherlands, Taiwan, USA, China, and offices in India and Japan. In 2016, imec's revenue (P&L) totalled 496 million euro. Further information on imec can be found at [www.imec-int.com](http://www.imec-int.com).

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For more information, please visit [www.imec.be](http://www.imec.be).

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