

Quinas and IQE receive £1.1 million grant for ULTRARAM industrialisation

Innovate UK-funded project to be carried out with UK Universities of Lancaster and Cardiff

Lancaster, UK—17 July 2024—[Quinas](#), innovator of the award-winning new universal memory technology ULTRARAM™, has announced that it has been awarded an Innovate UK project worth £1.1 million (US\$1.43 million) to be carried out jointly with global semiconductor company [IQE](#) and the Universities of [Lancaster](#) and [Cardiff](#), both in the UK.

Lancaster University spinout firm Quinas will coordinate the ambitious project, which is the first step towards volume production of the universal computer memory ULTRARAM invented by Lancaster Physics Professor Manus Hayne.

ULTRARAM has extraordinary properties, combining the non-volatility of a data storage memory like Flash, with the speed, energy-efficiency, and endurance of a working memory like DRAM.

Most of the funding for the one-year project will be spent at IQE, which will scale up the manufacture of compound semiconductor layers from Lancaster University to an industrial process at the Cardiff-based firm. This will involve IQE developing advanced capability for growth of the compound semiconductors gallium antimonide (GaSb) and aluminium antimonide (AlSb) for the first time. The project follows significant investment to boost the UK semiconductor industry and the establishment of the world's first compound semiconductor cluster in South Wales.

Dr Peter Hodgson, who is leading the project, and is also co-founder and Chief Technical Officer at Quinas, said: "This grant marks an important milestone as we move towards mass production of ULTRARAM. We are delighted to be working with IQE on this ambitious project and their support is testament to our technology's commercial potential. A memory combining non-volatility with fast, energy-efficient write and erase capabilities has previously been considered unattainable. ULTRARAM's ability to switch between a highly resistive state and a highly conductive state is the key to its unique properties"

James Ashforth-Pook, CEO and co-founder of Quinas, said: “It is estimated that the global memory chip market will be worth about US\$320 billion by 2030, but the UK currently has no stake in it. Future compute will place ever-increasing demands on memory capability, driven by emerging applications like novel AI and quantum compute, as well as evolution in more traditional markets like defence and aerospace. ULTRARAM’s unique combination of non-volatile storage and rapid access memory addresses many of those needs, offering the potential for huge energy savings and carbon emission reduction.”

ULTRARAM's energy efficiency is certainly impressive. It has a reported switching energy per unit area that is 100 times lower than DRAM, 1,000 times lower than flash, and over 10,000 times lower than other emerging memories. Its ultra-low energy credentials are further enhanced by its non-destructive read and non-volatility, which removes the need for refresh.

The goal of the one-year project to industrialise the process involves scaling up ULTRARAM wafer diameters from 75mm (3-inch) at Lancaster to 150mm (6-inch) at IQE. This will be achieved by using the mainstream production technique of metal-organic vapour phase epitaxy (MOVPE), also called metal-organic chemical vapour deposition (MOCVD), rather than molecular beam epitaxy (MBE), which is typically used at universities.

Lancaster will carry out some initial MBE epitaxy as a control/template for the industrial growth activities of IQE and Cardiff. These antimonide materials will be characterised and, once sufficient quality is confirmed, ULTRARAM memories will be fabricated at Lancaster on small areas of the wafers from IQE. By testing and comparing the performance of these devices we will evidence the success of the industrial epitaxy. Quinas will co-ordinate the project, provide technical support and carry out exploitation activities.

In parallel with this, Lancaster will continue to work on ULTRARAM scaling, by reducing the size of individual devices (“Moore’s law”) and making larger and larger arrays. Once devices are small enough and arrays are large enough, the following stage will be to demonstrate fabrication on a complete 200mm (8-inch) wafer, and then to translate the process to an industrial one, suitable for a semiconductor fabrication facility (fab).

Professor Hayne, who is the Lancaster team lead, and is also co-founder and Chief Scientific Officer at Quinas, said: “We are delighted that Innovate UK is supporting this ambitious project, and that IQE has

committed to developing the first part of ULTRARAM mass production. This latest award takes the total of our grant funding up to £4 million.”

ULTRARAM is made from compound semiconductors, which are already used for high power transistors, RF devices and in photonic devices such as LEDs, laser diodes and infrared detectors. The memory exploits quantum resonant tunnelling and the unique properties of compound semiconductor materials to achieve its extraordinary properties.

Media inquiries:

James Ashforth-Pook
jamesap@quinas.tech

About Quinas

ULTRARAM™ is a remarkable, patented, memory technology developed by Lancaster University. It exploits a quantum-mechanical process called resonant tunnelling, allowing ULTRARAM™ to deliver non-volatility with fast and energy-efficient write and erase, resulting in high endurance. This combination of properties was thought to be unachievable until now. ULTRARAM™ has the non-volatility of flash, with a performance that is expected to exceed that of DRAM.

For more information please see <https://quinas.tech/>

About IQE

IQE is the leading global supplier of advanced compound semiconductor wafers and materials solutions that enable a diverse range of applications across:

- Smart Connected Devices
- Communications Infrastructure
- Automotive and Industrial
- Aerospace and Security

As a scaled global epitaxy wafer manufacturer, IQE is uniquely positioned in this market which has high barriers to entry. IQE supplies the global market and is enabling customers to innovate at chip and OEM level. By leveraging the Group’s intellectual property portfolio including know-how and patents, it produces epitaxy wafers of superior quality, yield and unit economics.

IQE is headquartered in Cardiff UK, with employees across eight manufacturing locations in the UK, US and Taiwan, and is listed on the AIM Stock Exchange in London.

For more information please see <http://iqep.com>