# MEMS Solution for Evonetix

## Synthesized DNA

### DNA sequencing

**For more than three decades DNA has been synthesized by constructing individual strands through sequential chemical addition of bases and then combining them to create longer, double-stranded DNA. Despite various improvements in the approach, there remain numerous problems in the synthesis of longer DNA. Current techniques are typically provided as a service, are slow, cannot synthesize all sequences and often incorporate random errors, requiring cloning time-consuming further analysis and sequencing to ensure acceptable quality. In addition, synthesis of error-free DNA becomes increasingly difficult as the length increases, creating challenges for its use in synthetic biology where the ability to access high-fidelity DNA at scale is an important requirement.**

### Continuous flow

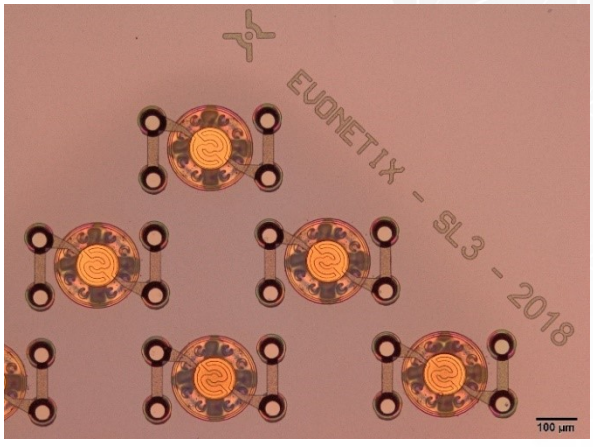
Most existing technologies physically isolate the different oligonucleotides during synthesis in a well. In contrast, with this new technology, array operates in a continuous flow of liquid with virtual wells made by independently controlled temperature islands. The extremely low effective volume of these virtual wells minimizes reagent consumption and therefore cost, whilst the flexibility afforded by the lack of physical boundaries enables innovative synthesis and assembly processes, which are ultimately the key to the ability to synthesize long DNA fragments.

### MEMS and microfluidic processing

This new proprietary approach utilizes a silicon chip, made by MEMS processing, that integrates physics with biology, and controls the synthesis of DNA at many thousands of independently controlled reaction sites or ‘pixels’ on the chip surface in a highly parallel fashion. Our approach is compatible with both chemical and enzymatic DNA synthesis. Following synthesis, strands are assembled on-chip into double-stranded DNA in a process that identifies and removes errors, providing accuracy that is several orders of magnitude better than the conventional approach.

### Solution

The key innovation in this approach is the realization of a thermal insulator that provides a controlled, anisotropic thermal resistance. We have engineered a novel structured material that achieves this and can be manufactured by LioniX International using a modified MEMs process.



evonetix

## Evonetix

The Evonetix is revolutionising gene synthesis with the aim of producing DNA at scale to enable many applications in the rapidly growing field of synthetic biology, across a wide range of industries, from pharmaceuticals to industrial biotech, specialty chemicals, renewables, bioremediation, agriculture and potentially also digital data storage.
The Company's platform is based upon a novel silicon array and unique synergistic thermal control chemistry, capable of synthesising oligonucleotides in parallel, at each of the 10,000 miniaturised reaction sites. The technology is compatible with both chemical and enzymatic gene synthesis and allows for exquisite control at each site of synthesis. It uses a process of error detection throughout assembly to yield high-fidelity long DNA molecules, including challenging sequences with high-GC content or repeats. Thus, Evonetix's approach permits massive parallelism in de novo DNA synthesis and enables high-throughput on-chip assembly of high-fidelity gene-length DNA at scale.
Evonetix is based in Cambridge, UK and was founded in 2015 by Cambridge Consultants Ltd and Providence Investment Company Limited. The Company raised £9 million in a series A financing, co-led by DCVC and Draper Esprit, and has been awarded Innovate UK co-funding for a £1.3 million gene synthesis project.

## LioniX International

LioniX International is a leading global provider of customized microsystem solutions in scalable production volumes.

We provide customized solutions for OEM's and System Integrators, from design to fully assembled modules, by vertical integration and in scalable production volumes. We maintain our technology leadership secured by a strong IP position.

LioniX International core competences are in Photonic Integrated Circuits (PIC), customized MEMS, and opto-fluidics.

**Read more on https://mems.lionix-international.com**

Our chips drive your business

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