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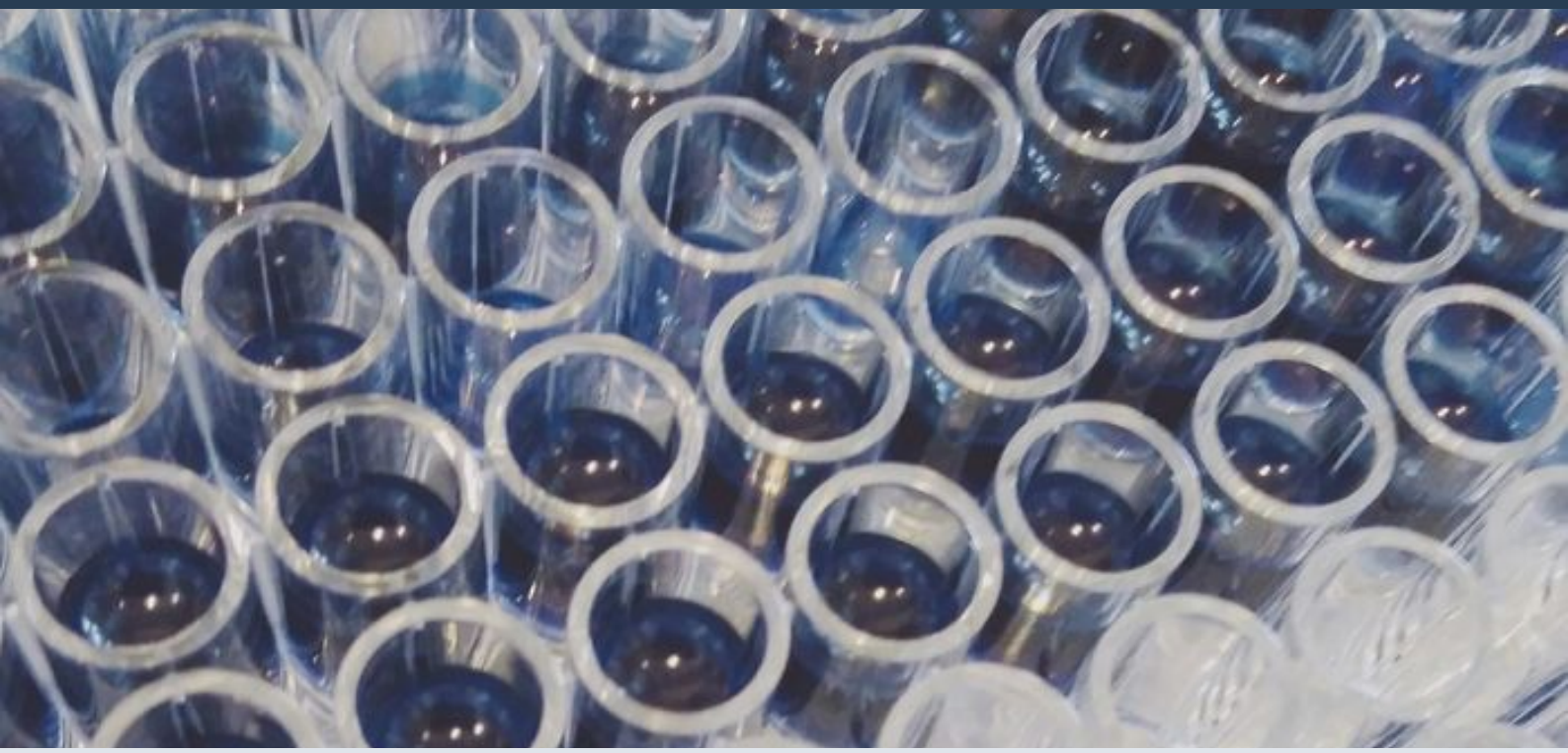
MxN: Semi-Automated, Low-Cost Liquid Handling Solutions

A molecular biology tool for conducting biological testing studies use liquid-handling to mix target samples “M” with “N” probes/primers

Reference: MxN



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IP Status

Patent application submitted

Seeking

Seeking investment, University spin out, Licensing, Commercial partner, Development partner

About **Dublin City University**

Dublin City University (DCU) aims to transform lives and societies through education, research and innovation. Research and Innovation at DCU stems from the academic excellence of its four faculties coupled with a passion for translating knowledge into innovations for economic or societal benefit.

Background

Molecular biology labs conducting biological testing studies use liquid-handling to mix target samples “M” with “N” probes/primers. This sample preparation process is conducted in thousands of laboratories across academic research, pharmaceutical, diagnostic, agricultural biotechnology, animal and plant genetics. **MxN** mixing is the laboratory-step that immediately precedes the screening analysis the MxN liquid handling and mixing process is implemented either manually or on costly liquid handling robots.

Problem

In low-throughput scenarios, where **M** and **N** are typically less than 8, MxN mixing is by manual pipetting. This is labour intensive e and error prone, resulting in high cost, high variability and poor-quality outputs. In medium throughout laboratories, where M and N can range between 8-30, a liquid handling robot costing up to €40k is typically required with extensive servicing costs.

Tech Overview

MxN delivers a microfluidically-enabled disposable cartridge (MxNChip) with a supportive, centrifuge-style instrument (MxNArm). MxNArm uses clever system design to allow for cross mixing of **M** samples with **N** reagents. The loading of the chip requires **M** + **N** pipetting steps from the user to create **M*N** assays. MxN’s 12x12 chips are capable of creating 144 10µl volume assays with just 24 pipetting steps, saving over 80% in manual pipetting from user.

MxN has potential applications in small/medium labs in DNA genotyping, combinatorial indexing, drug and compound screening and rare cell testing.

Benefits

The MxN will have the same format/shape as microtitre plates and so will maintain compatibility with existing laboratory equipment such as plate-handlers, readers and plate sealers. MxN is fully compatible with manual loading (pipetting) with the test time complete is just 90 seconds. The internal architecture of the cartridge contains metering and aliquoting reservoirs, thus improving the accuracy of each individual assay. Removal of human error have been transferred from the lab technician and integrated into the MxN consumable. This improves assay outcomes and increases the repeatability and reliability of each data point. The semi-automated test also reduces consumable and reagent waste, reducing the overall cost of each assay. The MxN is a fully sealed micro-fluidic chip means that decontamination/cleaning of liquid handling robotics is no longer required. MxN also realises the potential to create a 24x24 MxN which will offer even more effective parallelisation and automated arraying of liquids for high-throughput scenarios.

Applications

MxN has a unique position in the market, where the technology can be offered to small/medium sized labs. This technology is cheaper whilst still offering highly precise, rapid liquid handling solutions. The liquid displacement is determined by clever microfluidic design in the chip rather than relying on a highly expensive robotic pipetting system. This allows us to undercut the competition with reduced system costs, passing on the saving to the laboratory.

It is estimated that the US/North American and Western European market for low-to-medium throughput (benchtop) liquid handling systems will be US$430m by 2021. This low-to-medium throughput market segment refers to instruments with a price point of US$1,000-US$30,000. A further segment, described as automated liquid handling robotic stations, costs US$30,000+ and will be worth a further US$480m by 2021.

Opportunity

DCU are interested in exploring strategic partnerships and collaborations.

Patents

- Pending in US and Europe (US 16/464,982 and EP 17821797.2.). Title: “A fluidic device for aliquoting and combinatorial mixing of liquids”

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