Meukron Technologies Private Limited

CIN- U33127KA2022PTC161752

MEUKRON

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1. Business Overview

Meukron Technologies Private Limited is a deep-tech start-up based in Belagavi, Karnataka, and has an operating office in Bengaluru, Karnataka.

At Meukron, we specialise in the **Micromachining of Glass and Polymer substrates**, and currently we provide fabrication services to the Semiconductor and Biomedical Companies/ Institutions working on **MEMS packaging** and **Microfluidic Devices**.

Meukron is primarily incubated with the **Incubation at Centre for Nanoscience and Engineering** (**InCeNSE**) **IISc Bangalore**, and is virtually incubated with **Foundation for Innovation and Technology Transfer** (**FITT**) **IIT Delhi** and **Startup Incubation and Innovation Centre** (**SIIC**) **IIT Kanpur**.

2. Core Competencies

The core competency of Meukron Technologies is in the microfabrication of patterns and dies onto glass substrates. The company has developed a proprietary microfabrication manufacturing technology, which it utilises to fabricate custom designed Microfluidic patterns and dies for MEMS packaging. The proprietary technology viz. Electrochemical Discharge Machining (ECDM) is an alternative technique, which utilises electrochemistry and spark discharge, making it a material agnostic, rapid prototyping and flexible tool.

The company works with various glass substrates such as Soda Lime Glass, Borosilicate Glass, Fused Silica Glass, Quartz Glass, and others.

The current capabilities of the technology are highlighted below:

Capability	Description
Materials	Glass, Ceramics, Hard Polymers and Hard Plastics
Minimum Channel Width	Glass – 100 µm Polymers – 50 µm
Maximum Channel Width	No Limit
Minimum Channel Depth	20 Microns
Maximum Channel Depth	6000 Microns
Minimum Hole Size	100 Microns
Maximum Hole Size	No Limit
Minimum Aspect Ratio	1:0.5
Maximum Aspect Ratio	Glass – 1:10 Polymers – 1:2
Minimum Pitch Between two features	100 microns

In addition to Microfluidic patterns and MEMS packaging, the company also offers capabilities for Through Glass Vias (TGVs), and Optical Printed Circuit Boards (PCBs).

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3. Key Personnel

The founding team comprises of Mr. Neeraj Bagi and Mr. Ganapati Bagi. Mr. Neeraj is a Mechanical Engineering graduate from R.V. College of Engineering, Bangalore. He has a composite professional experience of working at multi-national companies such as GE Healthcare and Hindustan Unilever Limited (HUL), as well as a short stint at an early-stage startup viz. Andromeida Maritime Solutions. He currently handles Technology and Product Development, Sales and Marketing at Meukron Technologies.

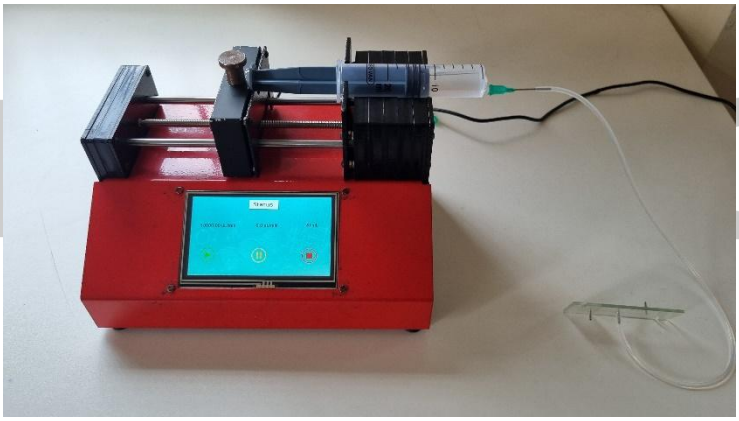
Mr. Ganapati Bagi is a Mechanical Engineer with more than 30 years of Professional experience of starting, operating, and running a profitable industry. At Meukron Technologies, Mr. Ganapati handles Compliance, Accounts, and Legal Affairs.

4. Products and Services

The company is offers services in the field of Microfabrication of patterns for Microfluidic devices and MEMS packaging for Glass substrates, Ceramics, Hard Polymers, and Hard Plastics.

Products –

a. Near-Pulseless Syringe Pumps for Microfluidics and Pharmaceutical Use cases



The Syringe Pump developed by us is a near-pulseless pump having a capacity to pump fluid at flow rates as low as 1µL/min to as high as 2000µL/min. The pump can handle syringes of 1mL, 2mL, 5mL, 10mL, and 20mL capacities, and it features an intuitive touchscreen as an HMI to get user input.

The motor and shaft engage in a direct-couple mechanism, which ensures that there is no backlash error due to high fluid backpressure in case there are multiple pumps used for the microfluidic device.

In addition to this, the syringe pump can also be controlled using a Windows system based software for more advanced and time-based flowrate control. This pump is specifically built to cater to the needs to microfluidic devices, and can be utilised only for R&D purposes in academic and industrial laboratory settings.

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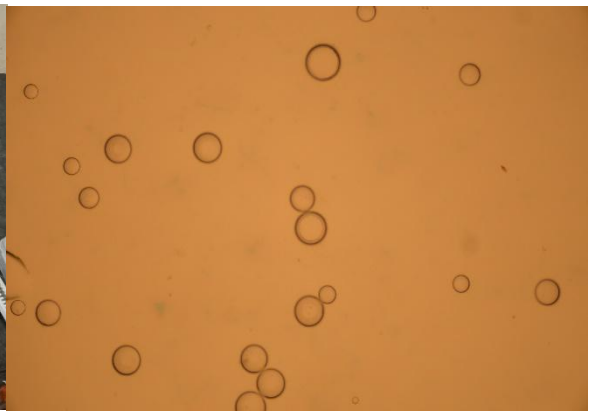
b. Droplet Microfluidic Setup with Heat Bed and Syringe Pumps

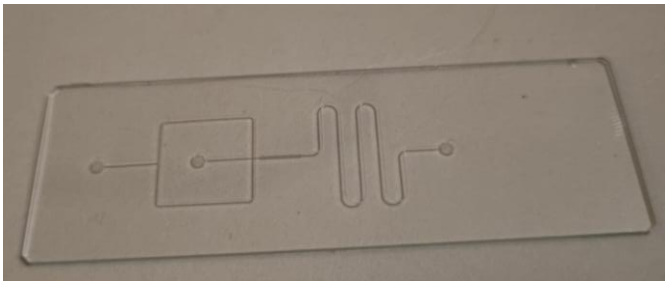


The microfluidic droplet setup as shown above comprises of two (2) syringe pumps, a glass droplet microfluidic device with two (2) inputs and one (1) output, a heating bed to heat the microfluidic device to a set temperature, a temperature controller, and a temperature feedback sensor.

This setup is specifically built to produce monodispersed agarose droplets of sizes 60µm to 100µm using flow separation at micrometre level.

The operating temperature of the setup is 75°C to 120°C. The temperature can set using a digital temperature controller. This setup can be customised to cater to different microfluidic needs.

c. Glass Droplet Microfluidic Device - Bonded - Single Output Channel - With Stainless Steel Connectors



This is a glass based monodispersed microfluidic device that can utilised to produce droplets of the intermittent fluid in a continuous fluid medium flow. This device is a single channel output, meaning that only one fluid flow stream is possible through this device. The device is bonded, and stainless steel connectors are attached to make it possible to connect silicone tubing to the device for fluid delivery. This device is also a part of the monodispersed droplet microfluidic setup.

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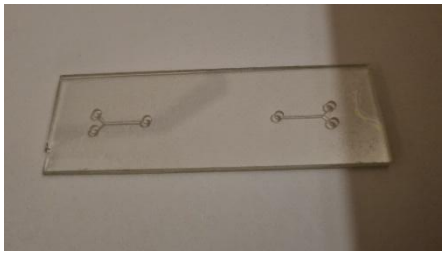
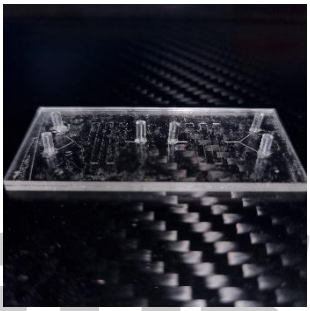
d. Glass Microfluidic Device - Serpentine Y-Channel – Bonded



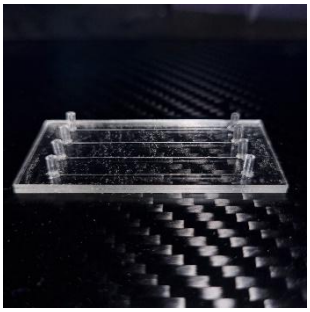
This device is a glass based Y-Channel microfluidic device. The application of such a device is mixing of two-miscible fluids at a uniform and constant rate. This device can also be used as a micro-mixer and micro-reactor, wherein the chemical reactions can be done on a micrometre level. This is a bonded device, and stainless steel connectors can be provided for easy fixing of tubing.

e. PMMA Microfluidic device - Serpentine Y-Channel – Bonded



This microfluidic device is a PMMA (acrylic) polymer based component. The application of such a device is mixing of two-miscible fluids at a uniform and constant rate. PMMA material is compatible with some bio-fluids, and has the added advantage of being highly transparent. This device is provided with acrylic and stainless steel connectors, based on the application of the customers.

f. PMMA Microfluidic device - 4 Straight Channel – Bonded



This is a PMMA (acrylic) polymer microfluidic device. This device is engraved with four (4) straight microfluidic channels. This device is generally used for starting microfluidic studies, and is a fundamental requirement in academic and industrial laboratories.

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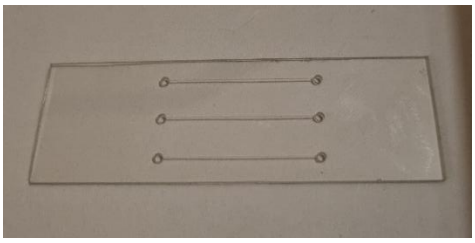
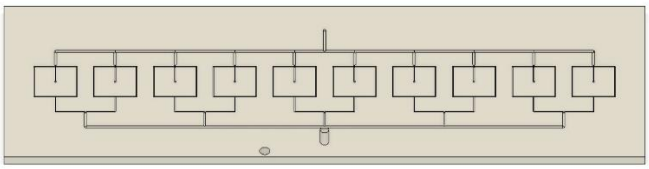
g. Glass Microfluidic Device - 4 Straight Channel – Bonded



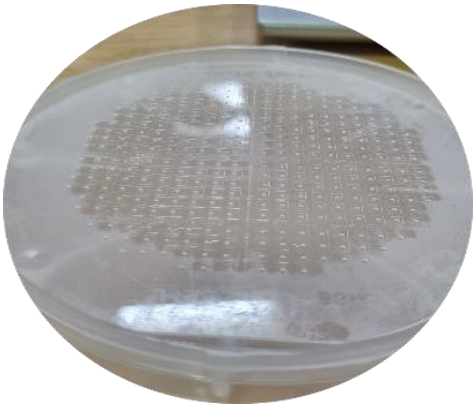
This is a soda-lime glass microfluidic device engraved with four (4) straight channels. This device can be used for fundamental studies in microfluidic flows. This device can handle biocompatible and harsh fluid reagents for microfluidic studies.

h. Glass Droplet Microfluidic Device - Bonded - Five (5) Output Channels - With Stainless Steel Connectors



This is a glass based monodispersed microfluidic device that can utilised to produce droplets of the intermittent fluid in a continuous fluid medium flow. This device is a multi-channel output, meaning that there can be upto ten (10) fluid flow streams possible through this device. The device is bonded, and stainless steel connectors are attached to make it possible to connect silicone tubing to the device for fluid delivery. This device is also a part of the monodispersed droplet microfluidic setup.

i. 4inch and 6inch Glass Wafer Through-holes, Micro-channels and Slot Micro-fabrication



Glass wafers are utilised in the semiconductor industry for MEMS as packaging and dies. We do custom fabrication of features such as through-holes, blind holes, micro-channels and others, based on customer needs and design.

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5. Clients and Projects

Thus far, the company has worked with thirty (30) customers in the Microfluidics domain and two (2) customers in the Semiconductor domain.

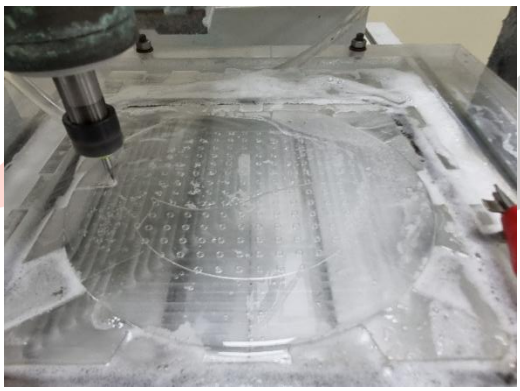
For MEMS packaging, the company has worked with Semiconductor Laboratory (SCL) Mohali, and the Centre for Nanoscience and Engineering (CeNSE) IISc Bangalore. With both the abovementioned clients, the company has demonstrated its capabilities by successfully delivering the designed devices for MEMS applications.

Project Case Studies:

I. Semiconductor Laboratory (SCL), Mohali

a. Fabrication of 2mm diameter dies onto 6-inch Borofloat 33 Glass Wafer

This project entailed the fabrication of slots for 2mm diameter dies onto 6 inch Borofloat 33 Glass Wafer. We fabricated the pattern onto two wafers, and the total number of devices summed up to 300. The fabricated dies were used as the main interfacing device for an endoscope styled apparatus with the objective of detecting cancer in the Gastrointestinal Tract.



b. Fabrication of 1.15mm, 1.6mm, and 2.4mm cylindrical dies

This project entailed the fabrication of 1.15mm, 1.6mm and 2.4mm cylindrical glass dies with a depth of 4mm and 6mm each. The cylindrical dies have four slots of 0.35mm each, which are at diametrically opposite to each other. These slots were utilised for the passing of four wires for MEMS communications.

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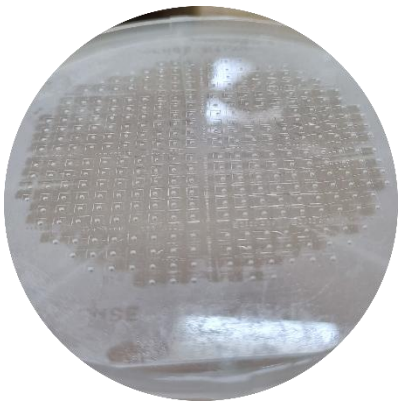
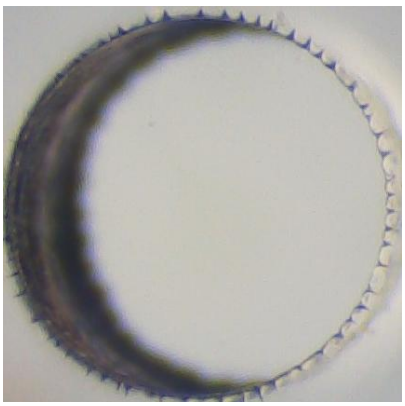
II. Systems and Packaging Lab, Centre for Nanoscience and Engineering (CeNSE) IISc Bangalore

a. Fabrication of 324 through glass holes for MEMS based pressure sensors

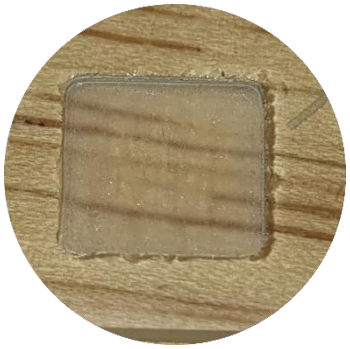
This project entailed the fabrication of 324 through glass holes on pre-fabricated square patterns of 50-micron depth. The through glass holes were fabricated on two 4-inch glass wafers of SD Hoya Glass make. The processed wafers were successfully converted into pressure sensors for Aerospace applications.





b. Fabrication of Glass Pockets

This project entailed the fabrication of glass pockets for the 3D IC packaging. The pockets were fabricated with the etching of 1000-microns and the left over thickness of 100 microns.



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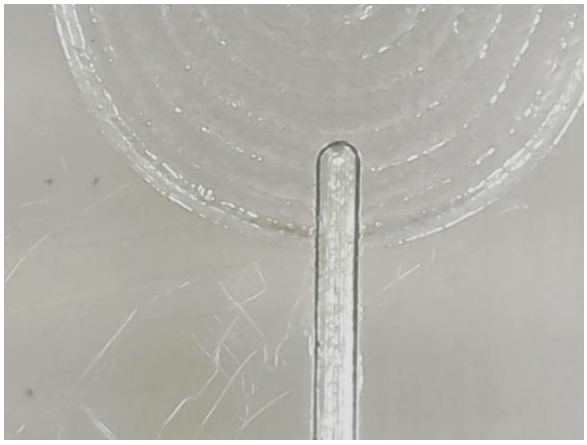
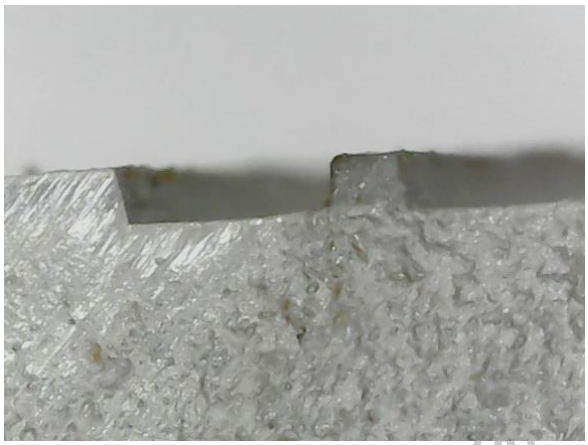
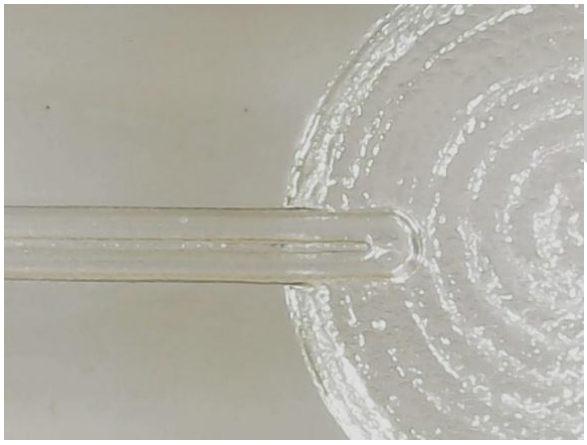
III. Fabrication of Microfluidic Chips for Lab-on-a-chip Devices

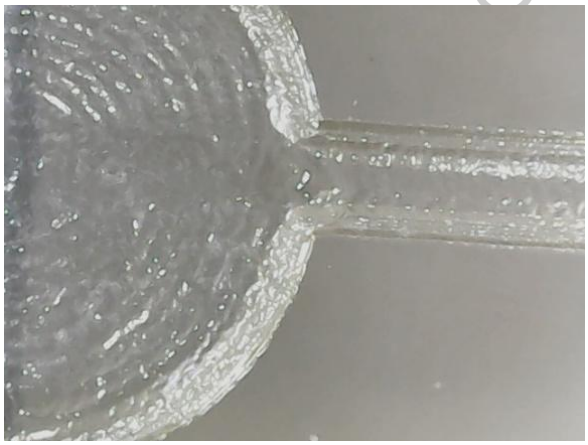
Meukron has fabricated various lab-on-a-chip devices encompassing applications such as Detection of Malaria, Thyroid-Stimulating Hormones (TSH), G6PD, Complete Blood Count (CBC), Separation of Blood cells – RBCs, WBCs, Plasma, and CTC, among others.

The following images highlight characteristics of various micro-channels fabricated onto PMMA substrates for the above-mentioned applications:









Note: Due to NDA clauses signed with our customers, we will not be able to display complete designs of the devices fabricated at our facility.

6. Contact Details

The primary contact person for Meukron Technologies Private Limited is Mr. Neeraj Bagi. Please find below the contact details:

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Mobile No. – +91-9353136327

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