

Static Micromixer with Minimized Dead Volume

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A static micromixer with a minimized dead volume is being developed in order to reduce waste volume particularly for 2 component adhesive dispensing applications where tiny volumes are dispensed.

Static mixers usually have relatively large internal volumes. 2 component adhesives can thus crosslink within the mixing element before they have been dispensed. The Micromixer can prevent this problem from occurring.

Properties

- Low internal volume (< 30 μl in recombination layer)
- Controlled/homogenous mixing process
- No dead spots (zero flow speed) in mixing element
- Small mixer size achievable (< $\varnothing 15\text{ mm} * 4\text{ mm}$)

Figure 1 shows the individual plastic layers of the micromixer with the stacked micro-channels which guide the 2 differently colored fluid-components to be mixed. The supports and adapters for the dispensing nozzle as well as 2 syringes are also shown.

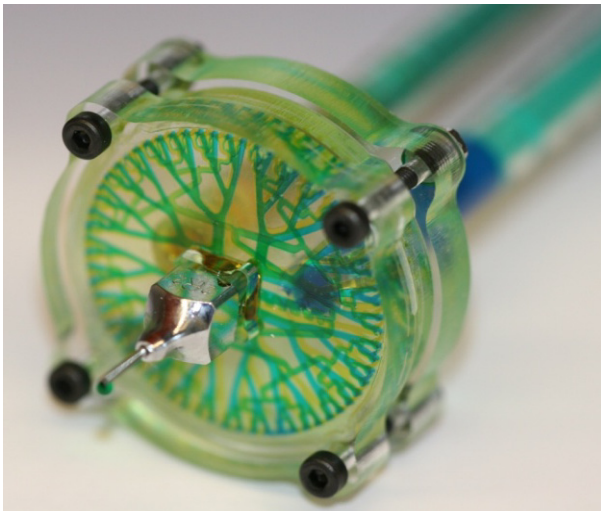


Figure 1: Static micromixer with nozzle attached

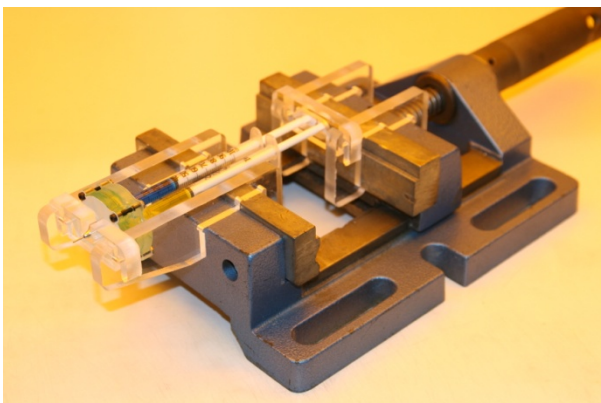


Figure 2: Static micromixer in a vise

Figure 2 represents the micromixer including disposable syringes in a vise enabling a controlled dispense of fluid.

Working principle

The micromixer basically consists of 3 functional layers: Two fluid distribution layers and one fluid combination layer.

Fluid components A & B are divided into N separate streams (128 in this prototype) and subsequently re-combined in one layer.

Figure 3 demonstrates the working principle showing the stacked micro-channels while two differently colored streams of glycerol were pumped through the mixer using disposable syringes shown in Figure 2.

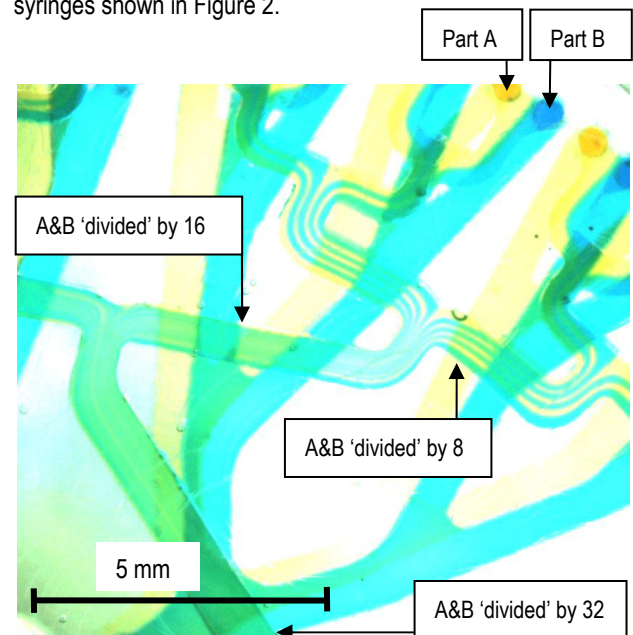


Figure 3: Micromixer working principle

Potential Applications

- Mixing of small volumes (in general)
- Adhesive mixing
- Online mixing

A disposable (low-cost) micro injection molded static mixing device can be manufactured based on this concept.

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