

## Overview

- fully automated liquid handling system
- handles liquid volumes in the **sub microliter range**
- injection molded **disposable tips (PipeJet-Tips) for droplet generation**
- **non-contact dispensing** with volumes down to 20 nl
- precision CV < 5 %
- PipeJet-Tips are compatible to standard pipetting system

## Introduction

Cross contamination free transfer of small liquid volumes on automated workstations is an important requirement for many life science applications. E.g. protein crystallography, high throughput screening or DNA analysis require a low dead volume and high precision. Disposable pipette tips provide the best safety regarding cross-contamination, but are limited to volumes in the microliter range.

## Methods

Droplet ejection method applied is based on PipeJet™ technology [1]:

- dosage by squeezing a liquid filled tube
- (re)-filling via capillary forces
- all elements containing liquid separated from actuator
- simple exchange of liquids by disposable tips
- liquid supply as free flying droplet
- no cross-contamination

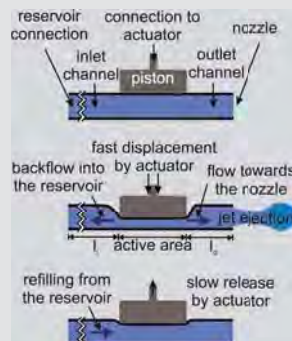


Figure 1: PipeJet working principle

## Results

Actuation unit automatically locks the PipeJet-Tips delivered by the handling robot, and enables the piezo electric actuation (see methods). First locking approach accomplished with BLDC motor and snail gear.

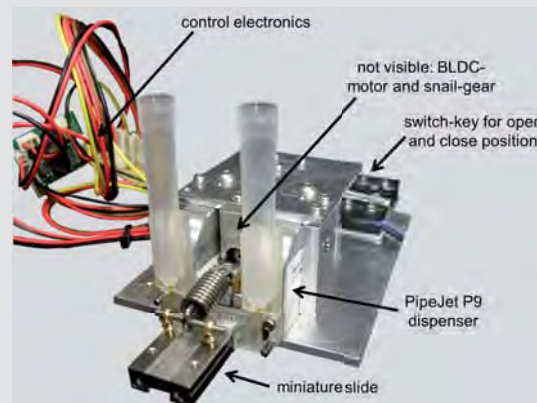


Figure 2: prototype of the automated actuator

Novel injection molded tips with 300 µl volume:

- compatible to existing 200 µl pipette interfaces
- applicable for conventional and PipeJet dispensing
- inner diameter of dispensing tube: ID = 650 µm
- 1 Component tip (polypropylene)
- 2 Component tip with molded-in polyimide tube



Figure 3: PipeJet-Tips: 1- (left) and 2-component (right) version

First characterization by gravimetical method:

- single droplets with volumes down to 20 nl (CV < 5%)
- multi-droplet dispensing for volumes in the µl range
- frequencies up to 50 Hz

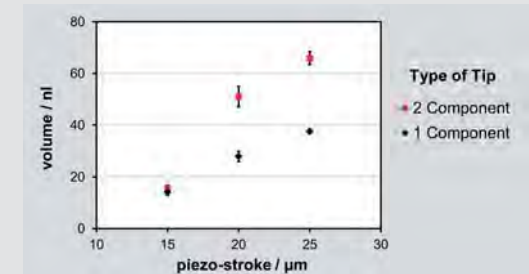


Figure 4: characterization of automatically locked PipeJet-Tips (single droplets)

## Conclusion

Our novel liquid handling technology based on PipeJet dispensing enables automatically exchangeable disposable tips. Free flying droplets of various media with volumes in the sub microliter range are ejected at high precision. The system is compatible with existing liquid handling systems.

## Acknowledgements

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## References

- [1] W. Streule, JALA Vol. 9 Issue 5, pp.300-306, 2004

## Contact

andreas.madjarov@imtek.de, +49-761-203-73265