

Design and Construction of a Novel Pipette Based on Marangoni Flow



TECHNISCHE
UNIVERSITÄT
DARMSTADT



Nano- and
Microfluidics

Advanced Design Project (ADP)

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Handling small amounts of liquid is an essential task in a broad field of applications ranging from medical and pharmaceutical engineering to analytical chemistry. The dispensing of liquids is typically done using pipettes that rely on a pressure difference to pull a liquid volume into a small reservoir after which the pressure difference is reversed for releasing the liquid volume.

Based on research at our institute we propose a novel type of pipette that leverages surface tension gradients that induce a so-called Marangoni flow instead of using pressure gradients for creating the flow. Our experimental results show that this could allow for pipetting tiny amounts of liquids or even gasses. There are numerous aspects of this novel approach that set it apart from classical pipettes making it superior in some application contexts. Within the ADP, a working demonstrator of this novel pipette should be designed, build and used to demonstrate the feasibility of this approach.



Classical laboratory pipette that relies on a pressure difference to fill and empty the reservoir.

(Source: sigmaaldrich.com)

The tasks of this ADP involve:

- Understanding the key aspects of the phenomenon that allows for this new approach
- Identifying key challenges and requirements
- Designing a demonstrator
- Building a demonstrator
- Demonstrating the pipetting process

What we offer

- Application-relevant topic that builds upon current fundamental research
- Working in our microfluidics lab with state-of-the-art equipment
- Detailed mentoring the whole time

Oil droplet moving upstream inside an ethanol jet surrounded by water due to Marangoni stresses.



**Interested?
Let's talk:**

Steffen Bisswanger

bisswanger@nmf.tu-darmstadt.de

