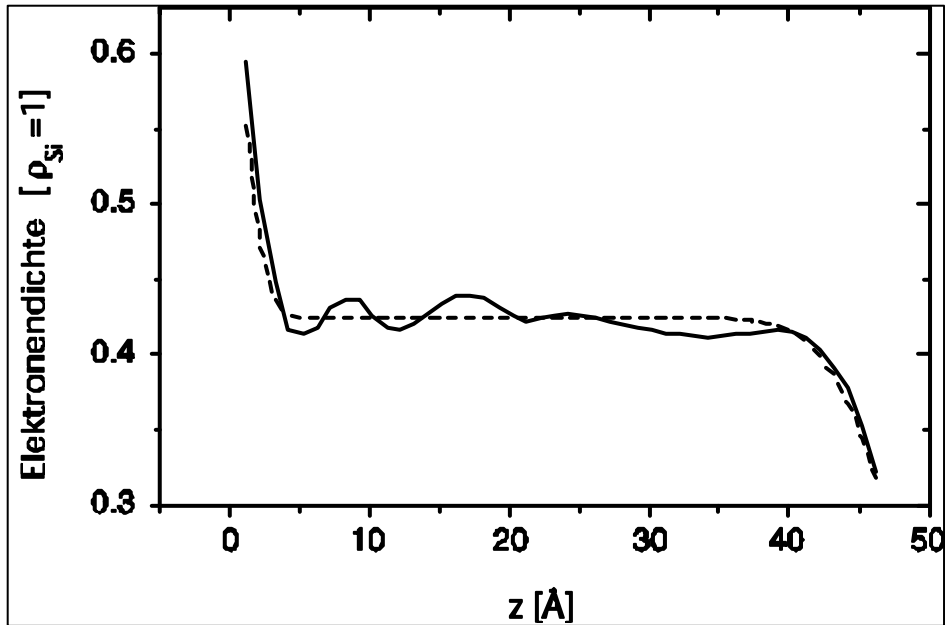
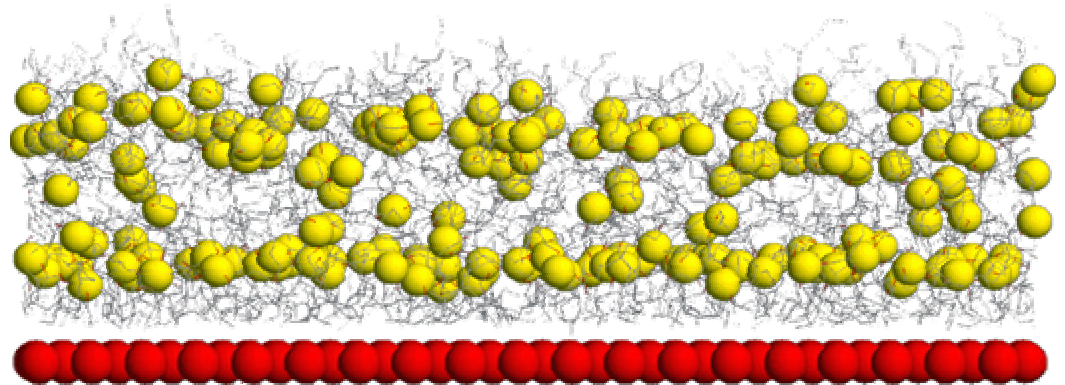


Liquid Layering - Beobachtung

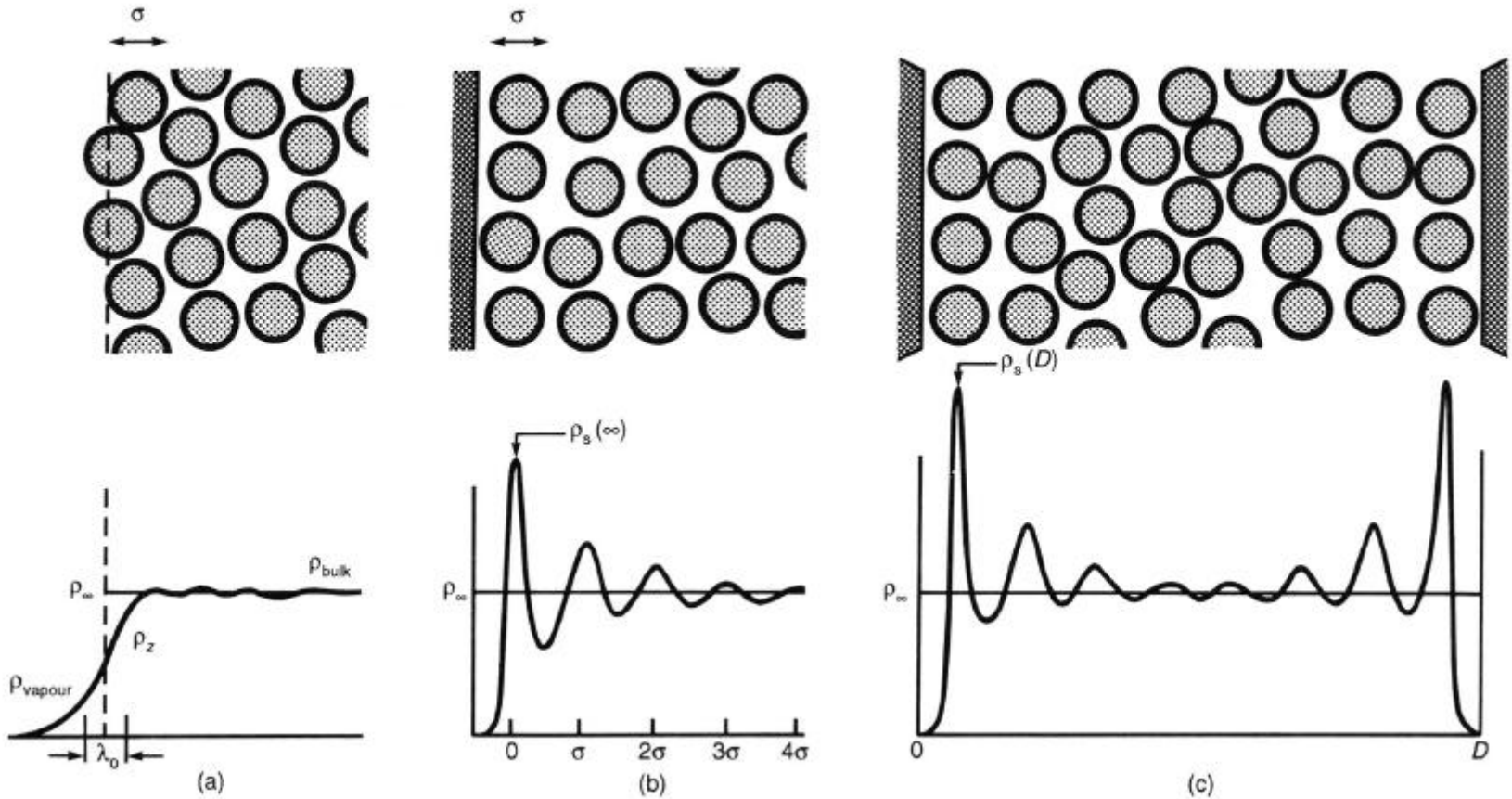


X-ray diffraction
TEHOS auf Si
(Yu et al., PRL 82, 1999, 2326)

MD-Simulation
(Frank Cichos, TUC)

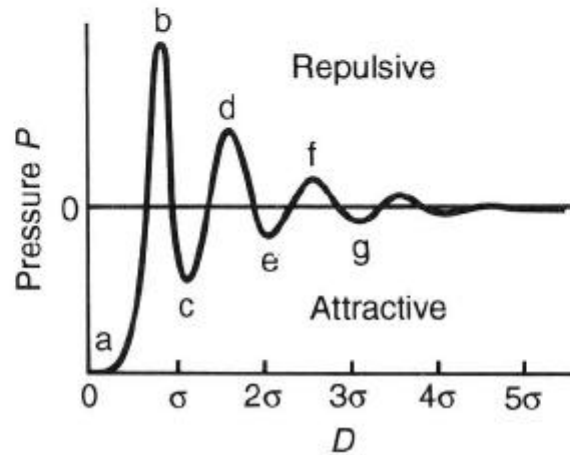
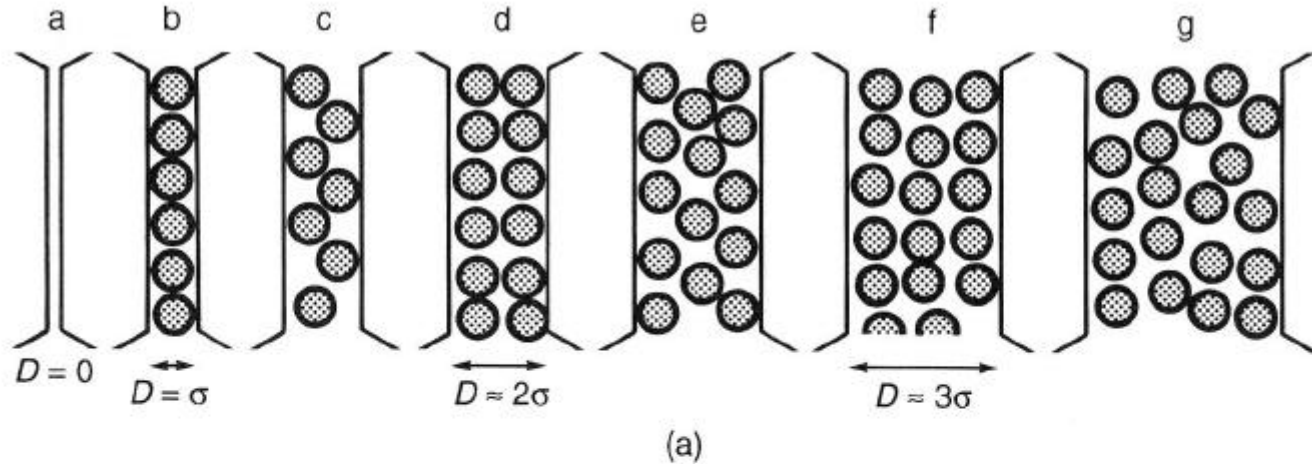


Liquid Layering - Erklärung



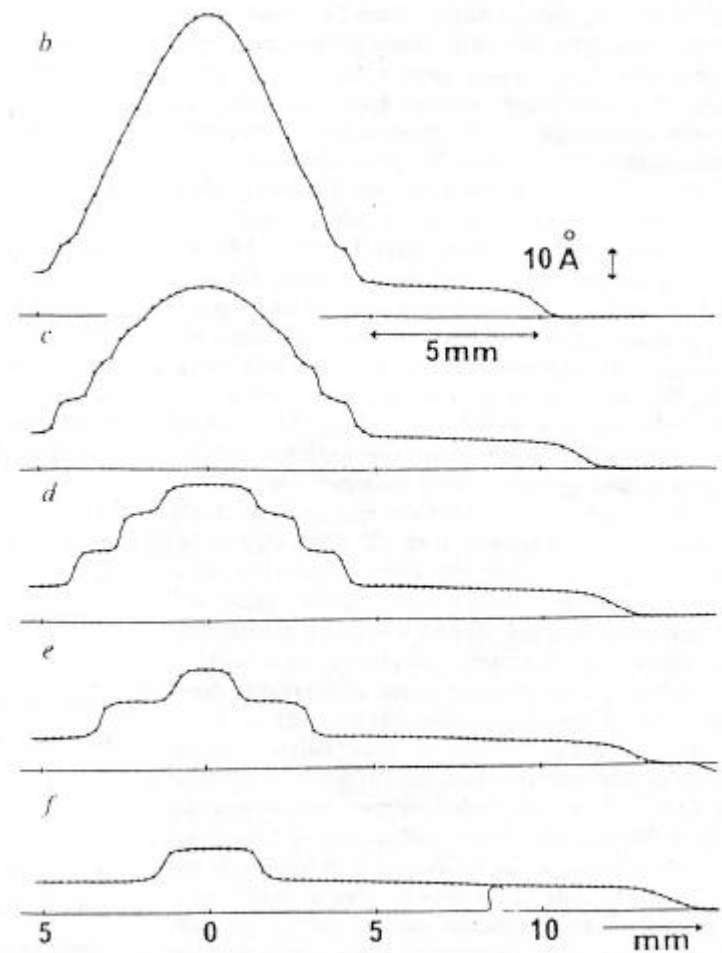
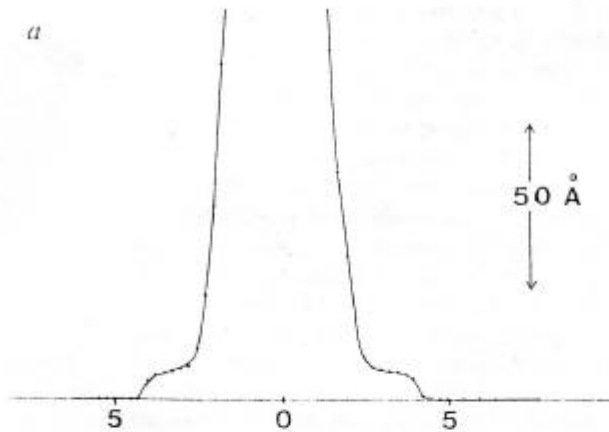
(Israelachvili: Intermolecular and Surface Forces)

Liquid Layering - Kräfte



(Israelachvili: Intermolecular and Surface Forces)

Terraced Spreading

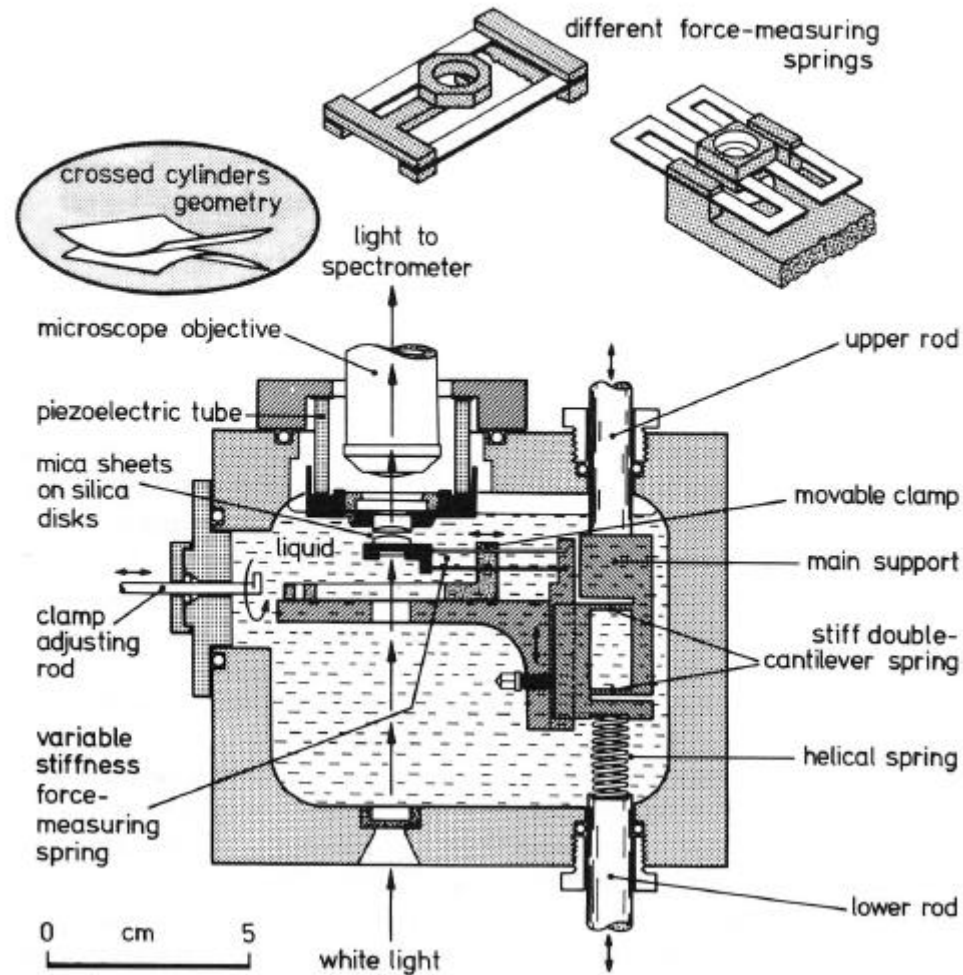


TEHOS auf Si,
nach a) 8h ... f) 168 h
(Ellipsometrie)

Surface Force Apparatus (SFA)

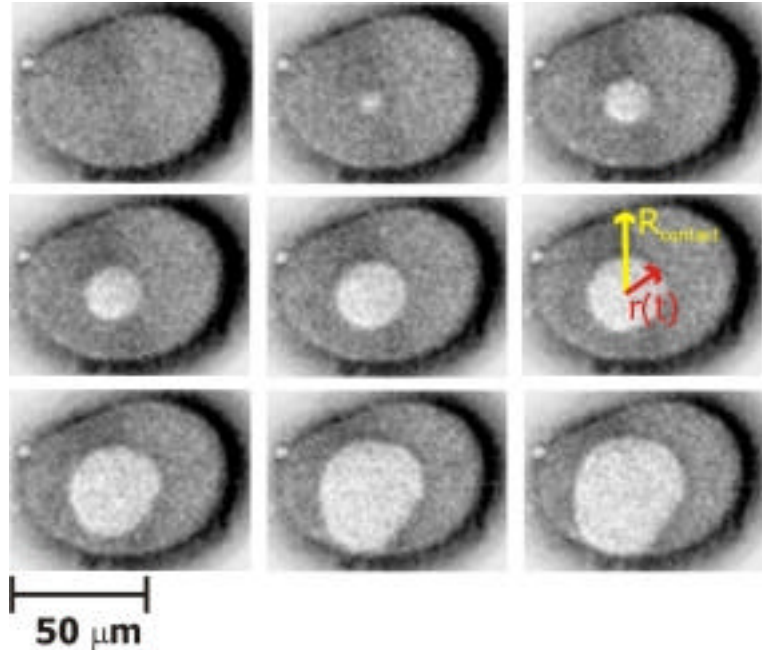
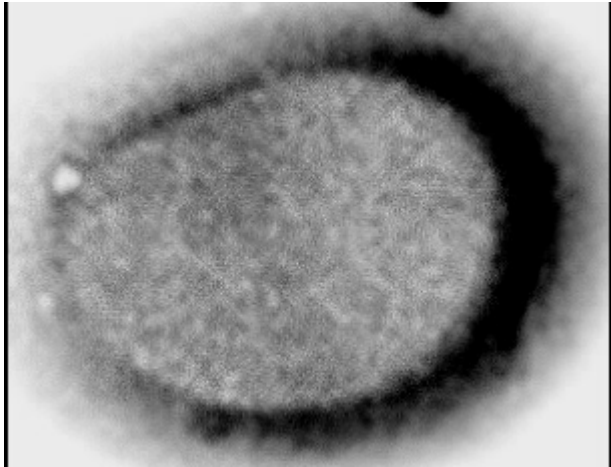
170

INTERMOLECULAR AND SURFACE FORCES



(Israelachvili: Intermolecular and Surface Forces)

Experimente mit dem SFA

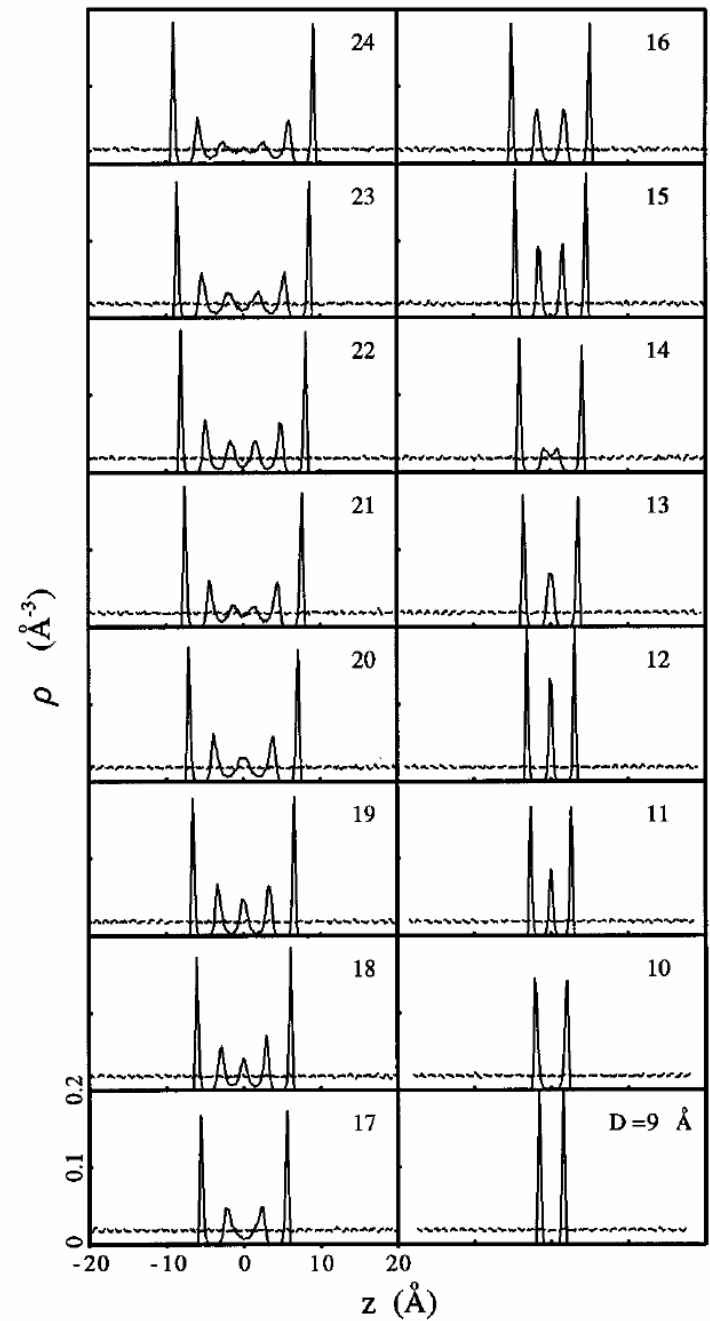
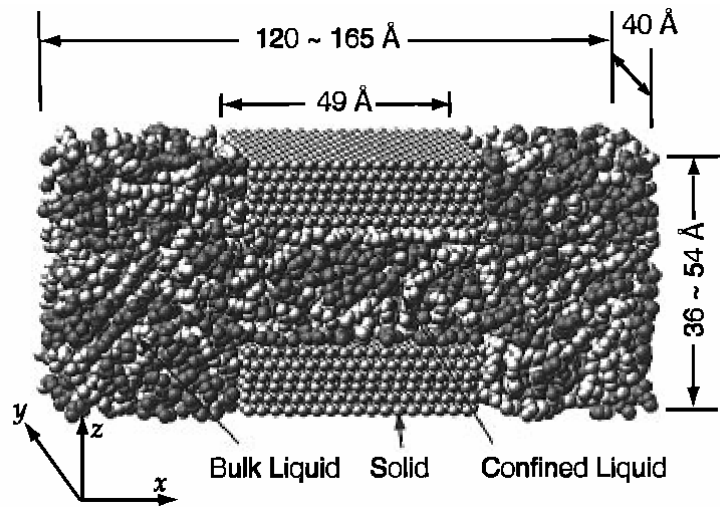


Herauspressen einer Monolage Moleküle (OMCTS, Mica)

F. Mugele, Uni Ulm

www.uni-ulm.de/uni/fak/natwis/angphys/deutsch/projektgruppen/mugele/SFA%20projekt.html

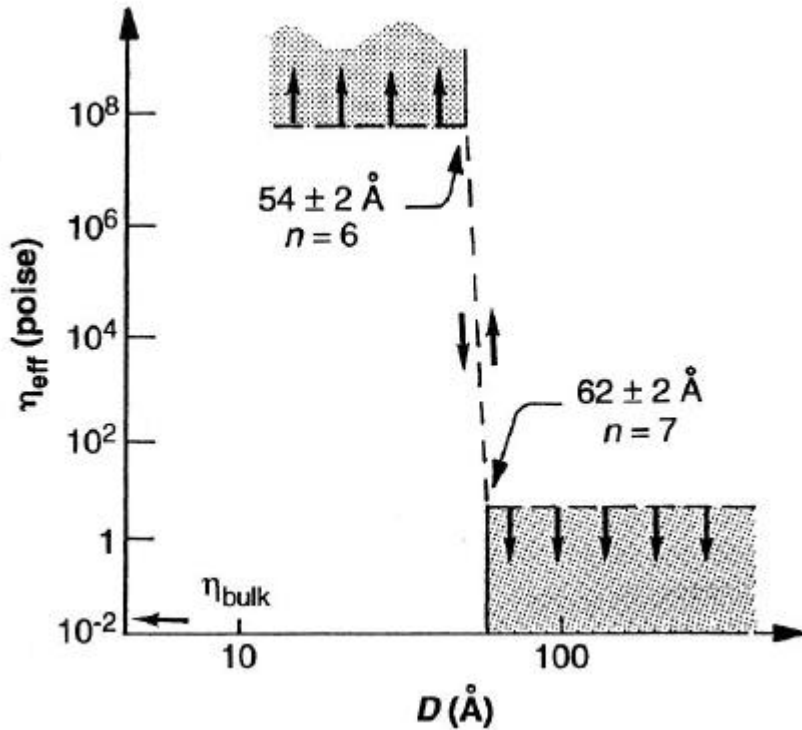
MD-Simulationen



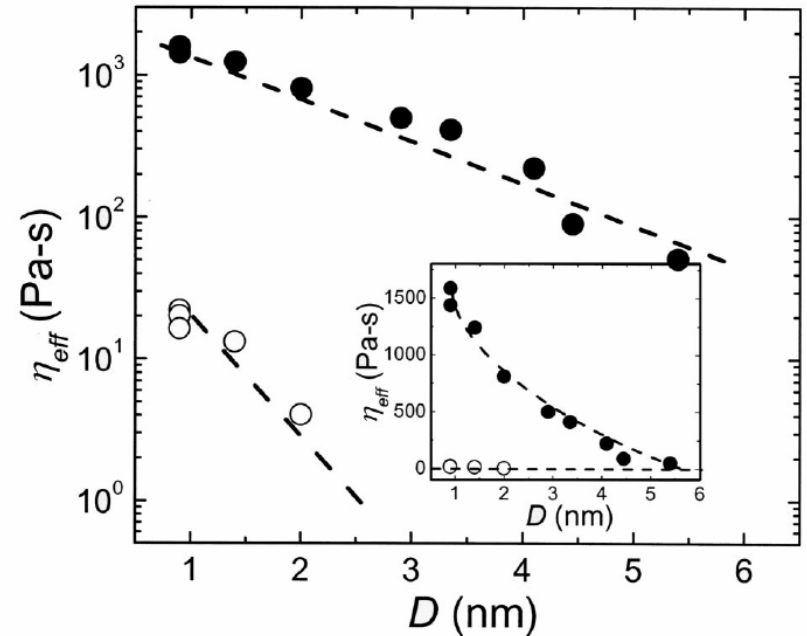
(Gao et al., J. Phys. Chem. B 101, 1997, 4013)

Viskosität dünner Flüssigkeitsfilme

Solidification



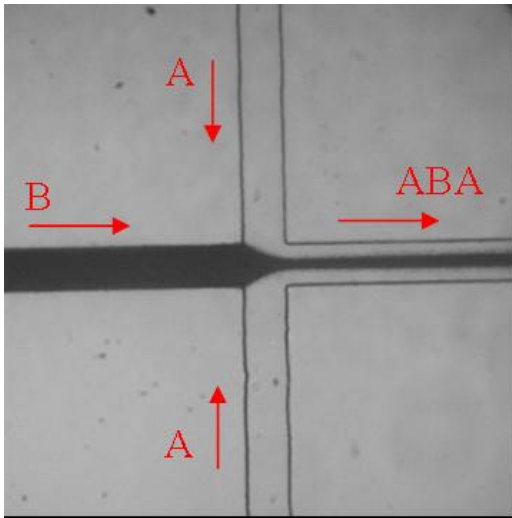
Abhängigkeit von Kompressionsrate



(Klein et al., Science 269, 1995, 816)

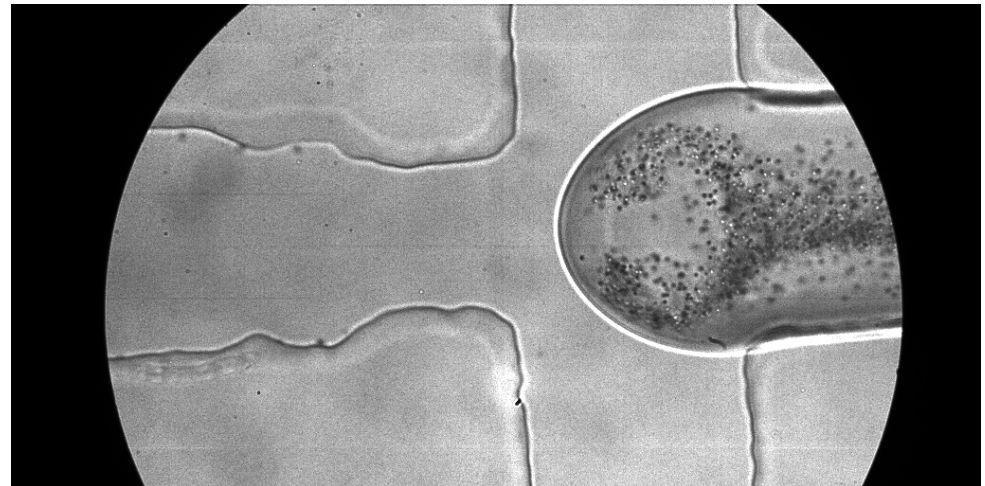
(Zhu et al., PRL 93, 2004, 096101)

Flow Focussing (hydrodynamic focussing)



Nicht mischbare Flüssigkeiten
(z.B. Öl, Wasser)

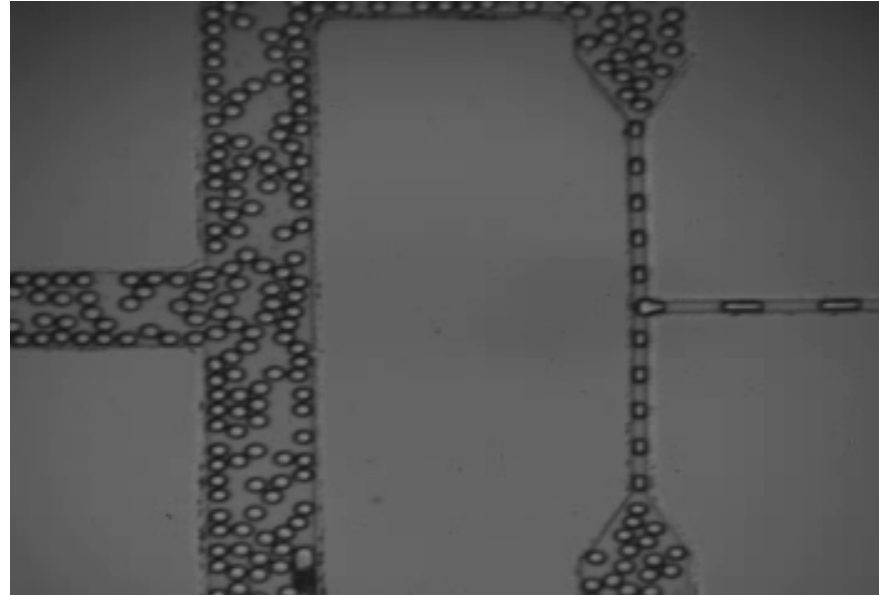
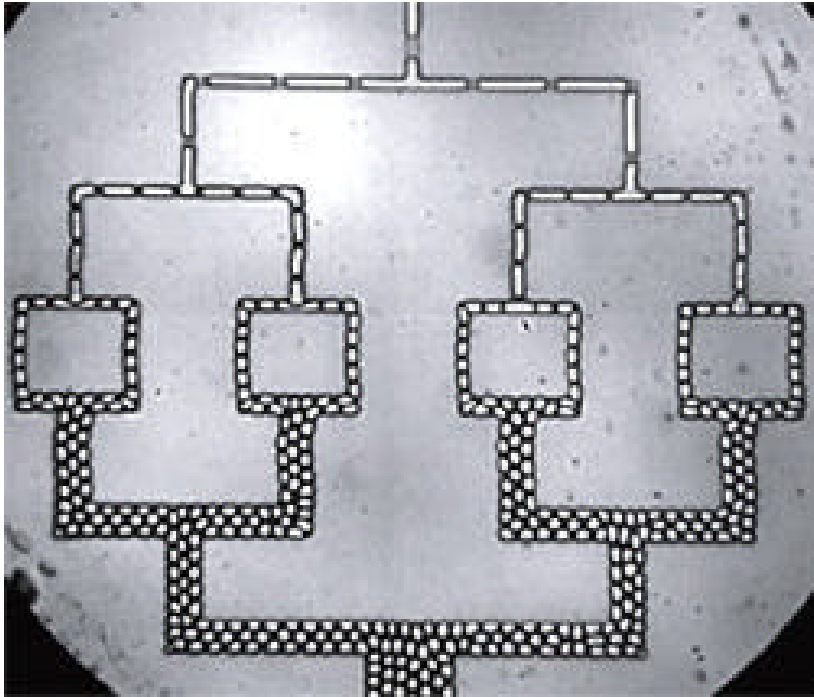
Abtrennen einzelner
Tropfen



D. A. Weitz, Harvard

www.deas.harvard.edu/projects/weitzlab/

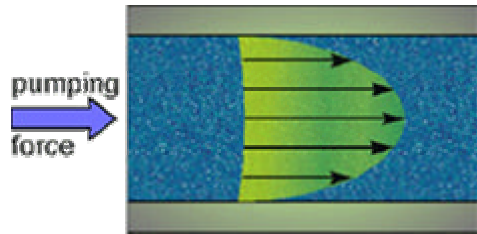
Tropfen zerteilen



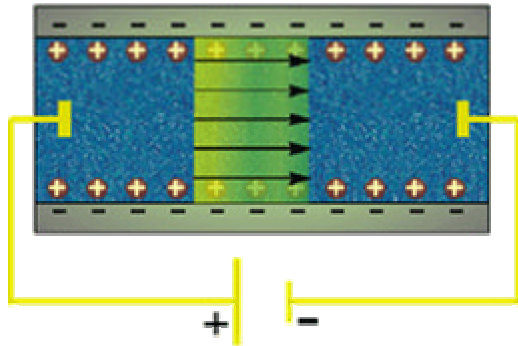
D. A. Weitz, Harvard

www.deas.harvard.edu/projects/weitzlab/

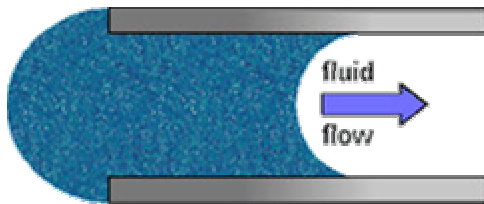
Antrieb für Strömungen



Hydrostatischer Druck (Pumpen)
Parabolisches Geschwindigkeitsprofil

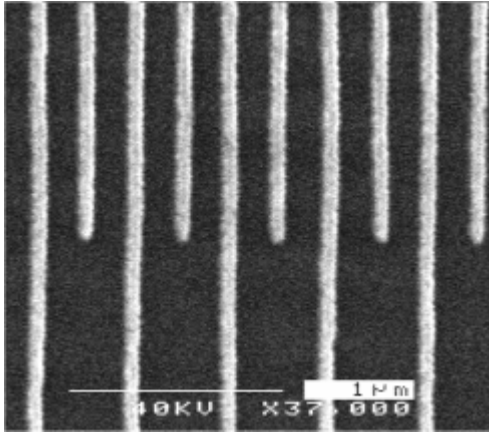


Elektroosmose
Konstante Geschwindigkeit über Querschnitt



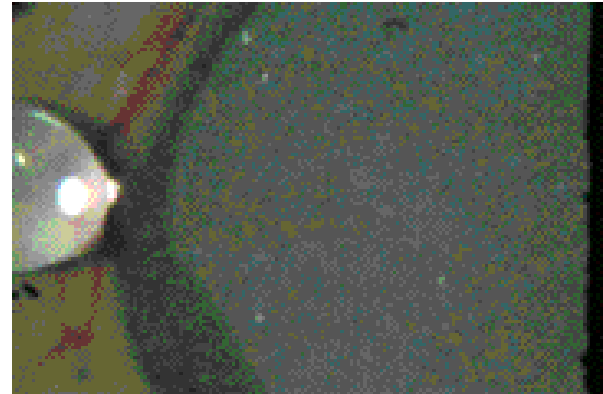
Kapillarkräfte

Tropfentransport 1

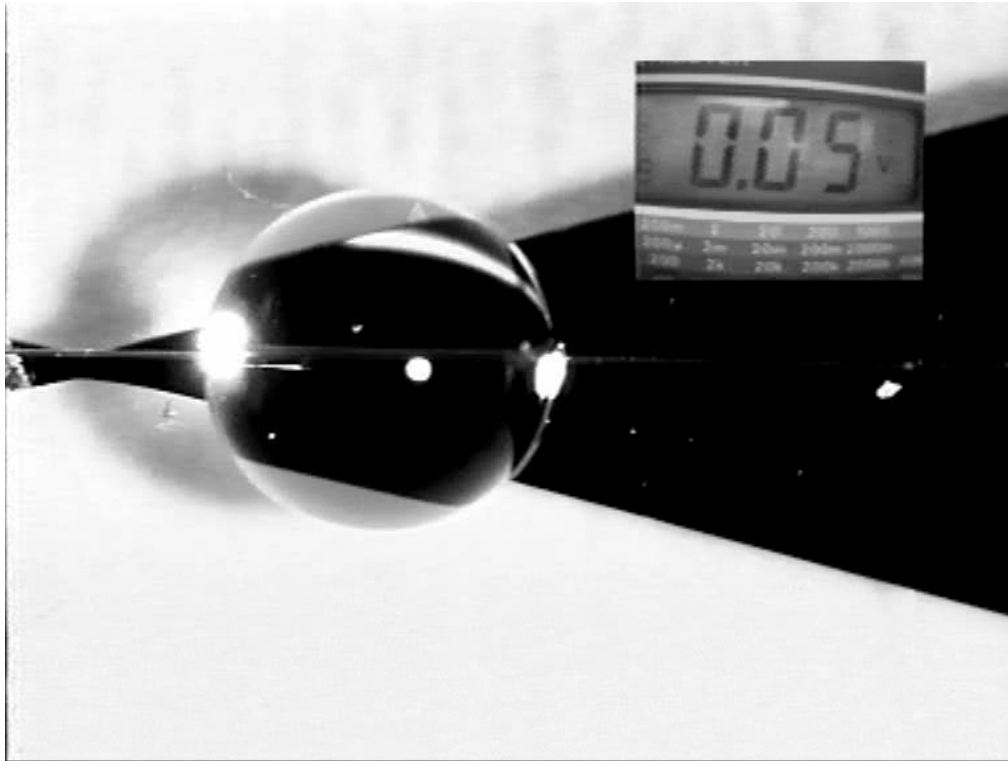


Piezoelektrischer Transducer (Handybauteil)
generiert Oberflächenwelle
(surface acoustic waves - SAW)

+ geschickte Modulation



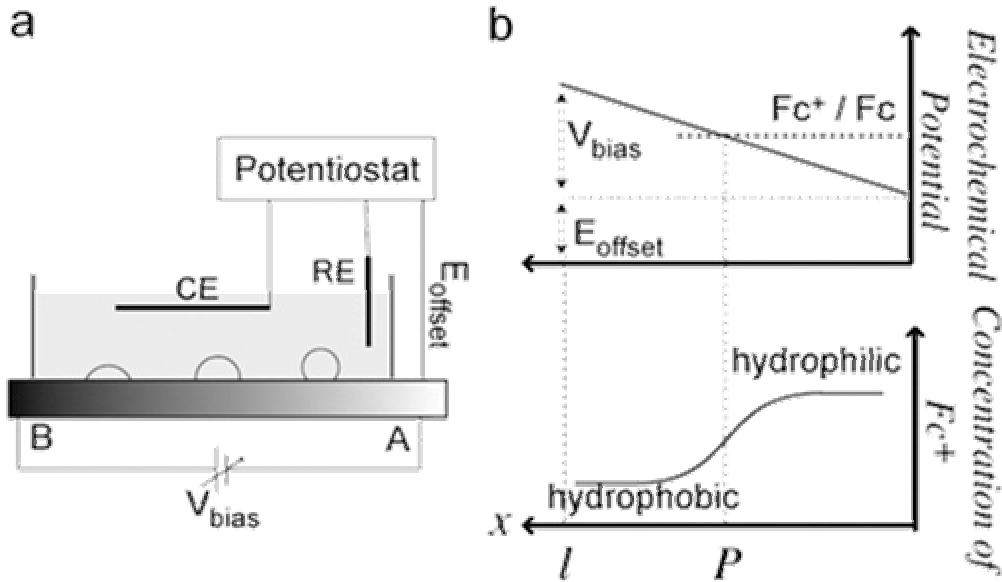
Tropfentransport 2



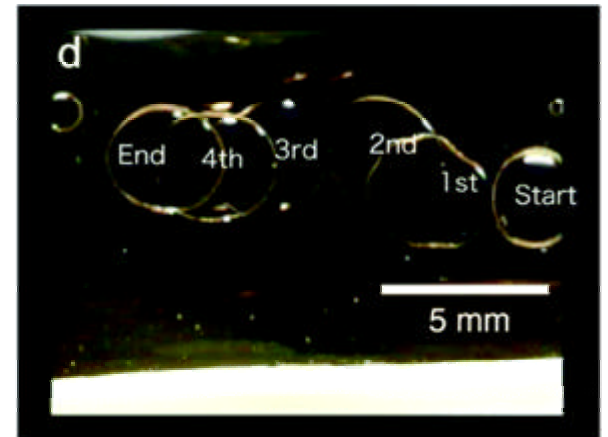
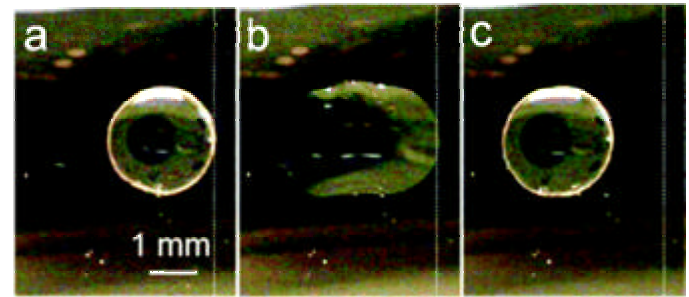
Electrowetting +
Strukturierte Elektroden

F. Mugele, Uni Ulm

Tropfentransport 3



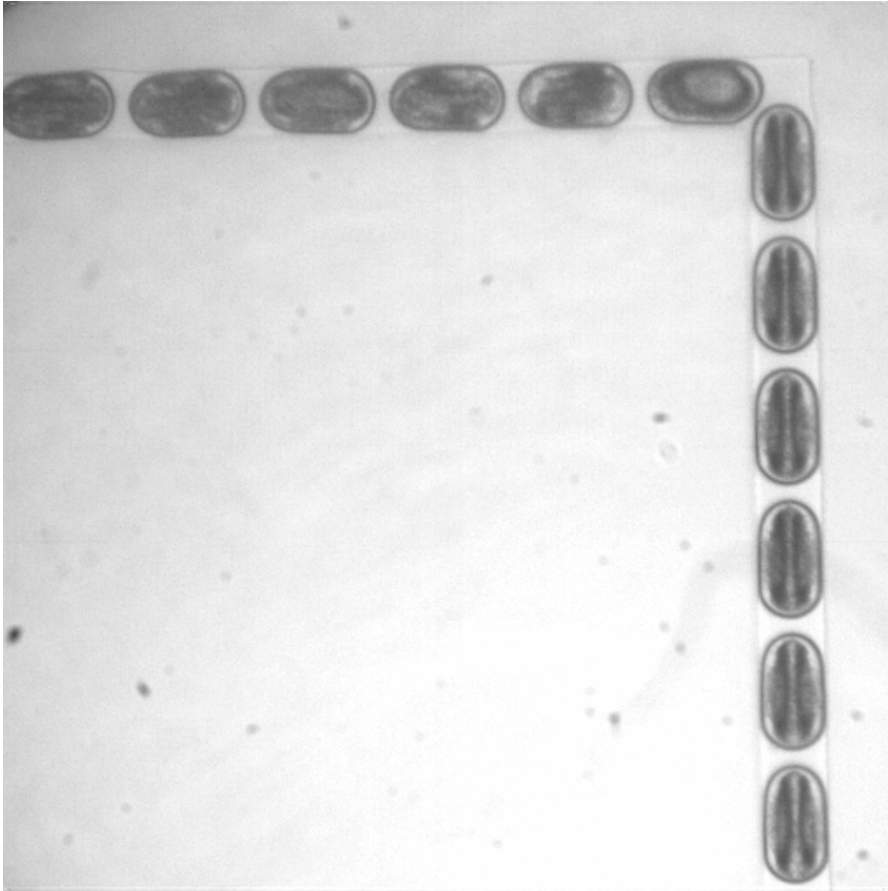
Benetzungsgradient durch
Feldgradient + Redoxreaktionen



Wurmartige Bewegung

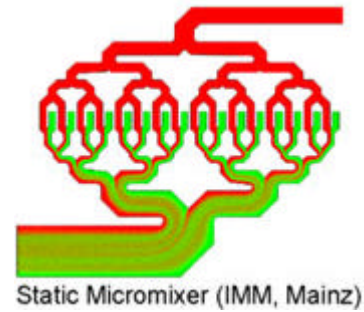
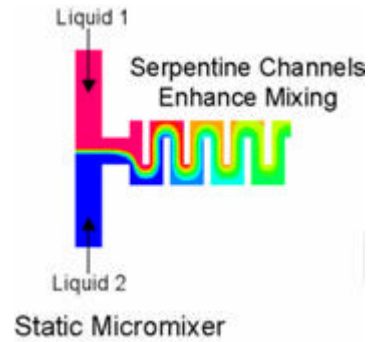
(Yamada et al., Langmuir 21, 2005, 4254)

Mischen 1



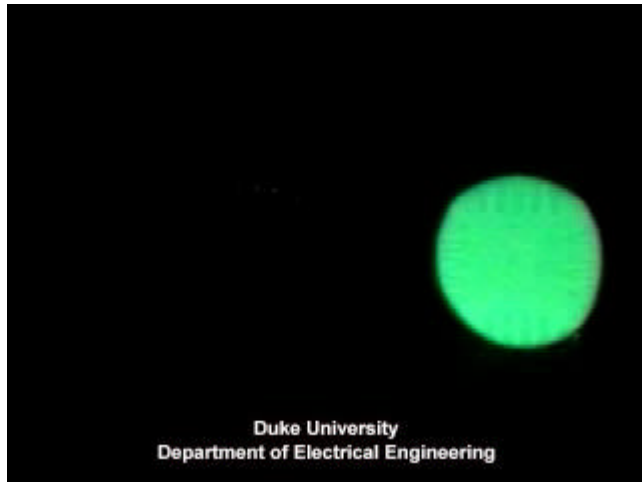
Laminarer Fluss, aber
Scherströmungen an den Ecken

Mischen 2



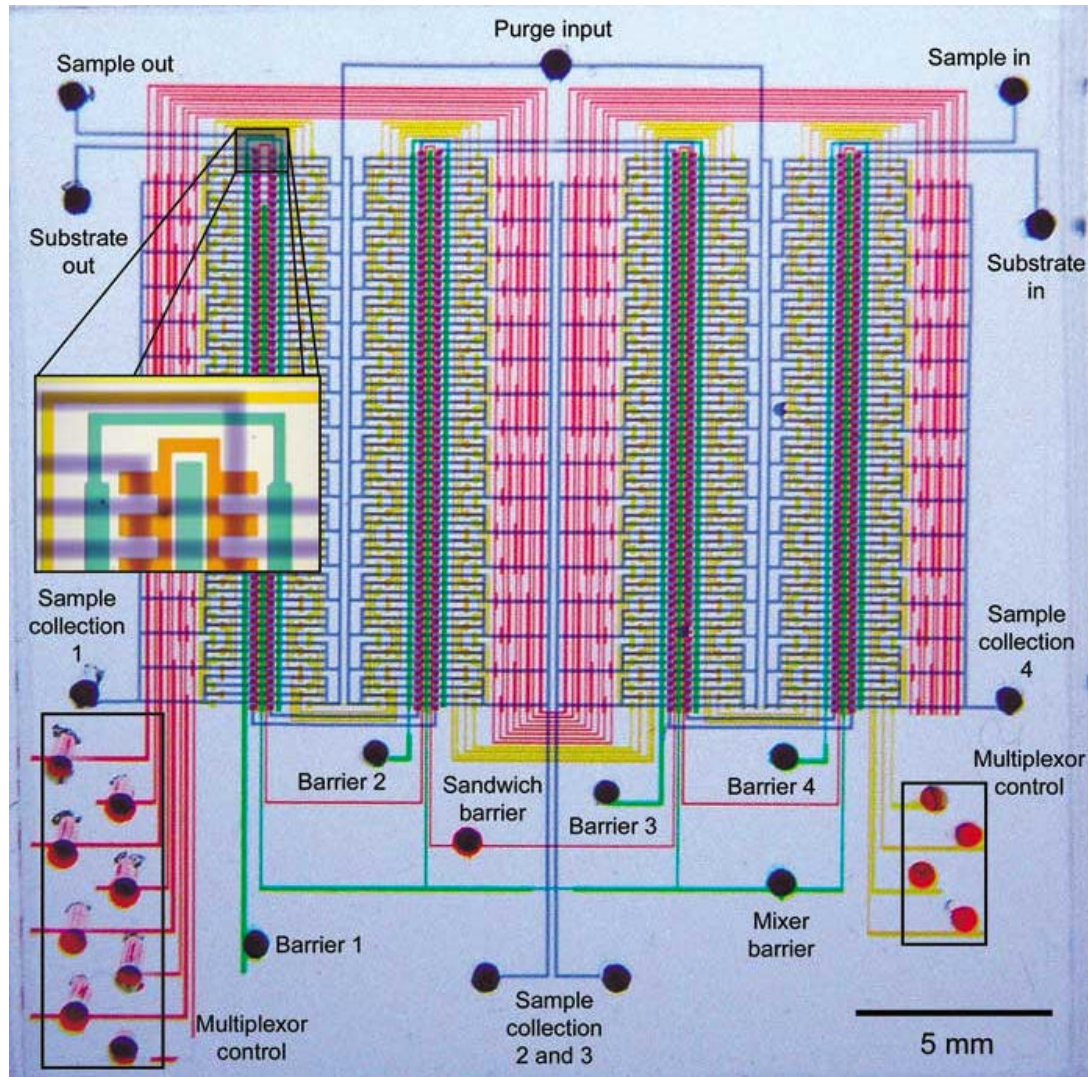
Oder andere Geometrien ...

Mischen 3



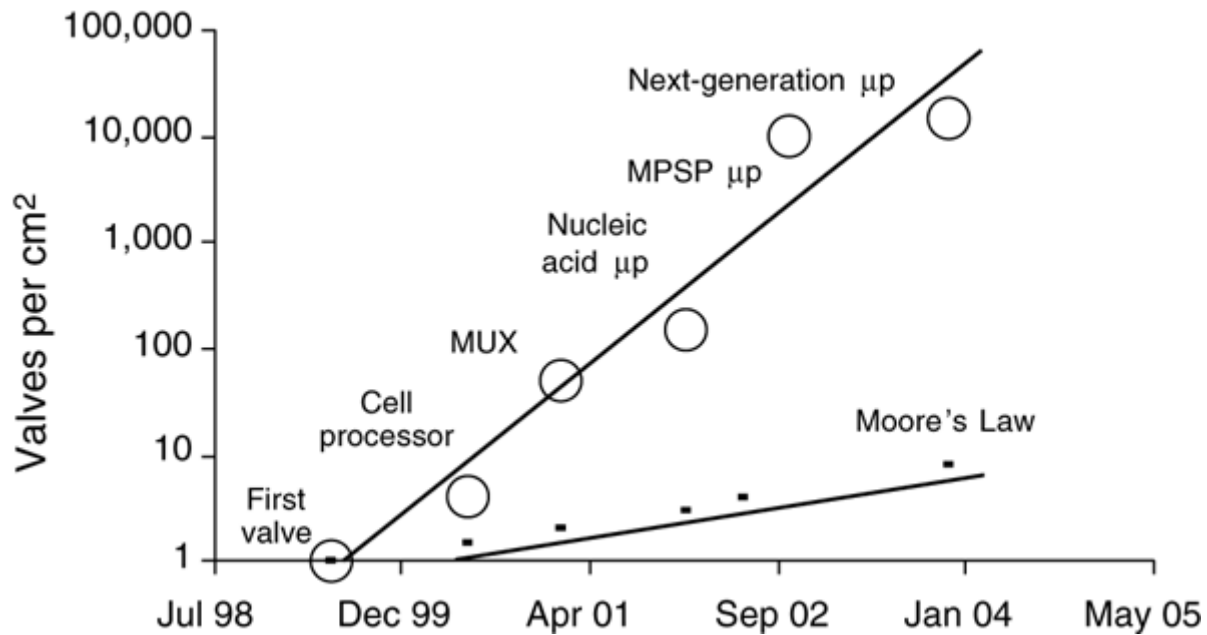
Mischen durch Bewegen
(Electrowetting)

Lab on a Chip



(Hong et al., Nature Biotech. 21, 2003, 1179)

Moore's Law?



(Hong et al., Nature Biotech. 21, 2003, 1179)