



Dynamics of micro-rods in micro-fluidic channels

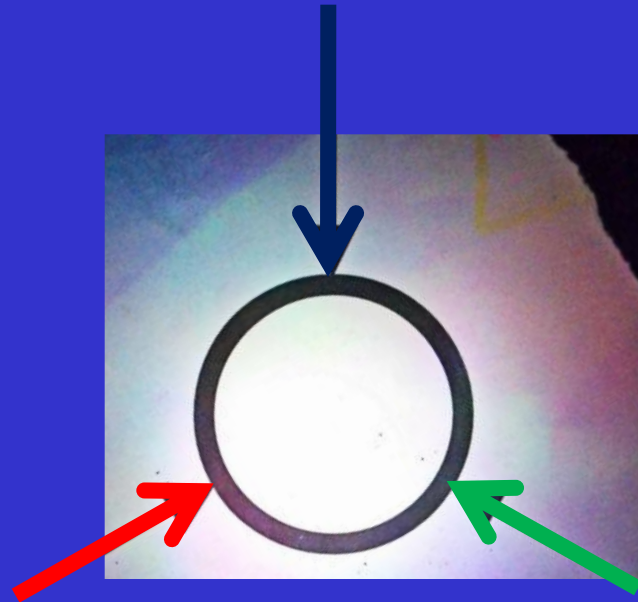
Dag Hanstorp

University of Gothenburg, Sweden

EUROMECH COLLOQUIUM 513, Udine, Italy
6-8 April 2011

Visualisation of particle orientation

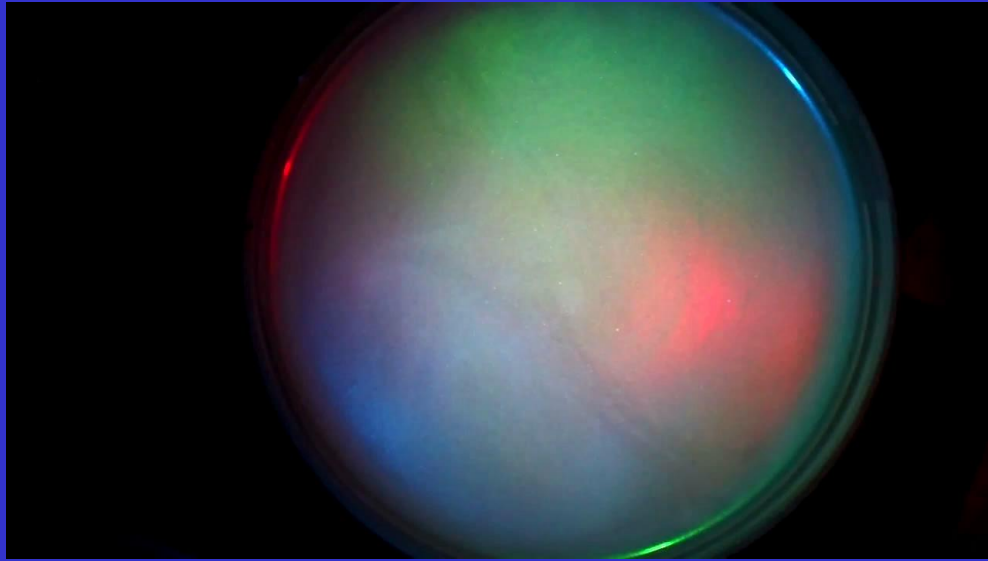
Light scatters as $\cos^2(\theta)$



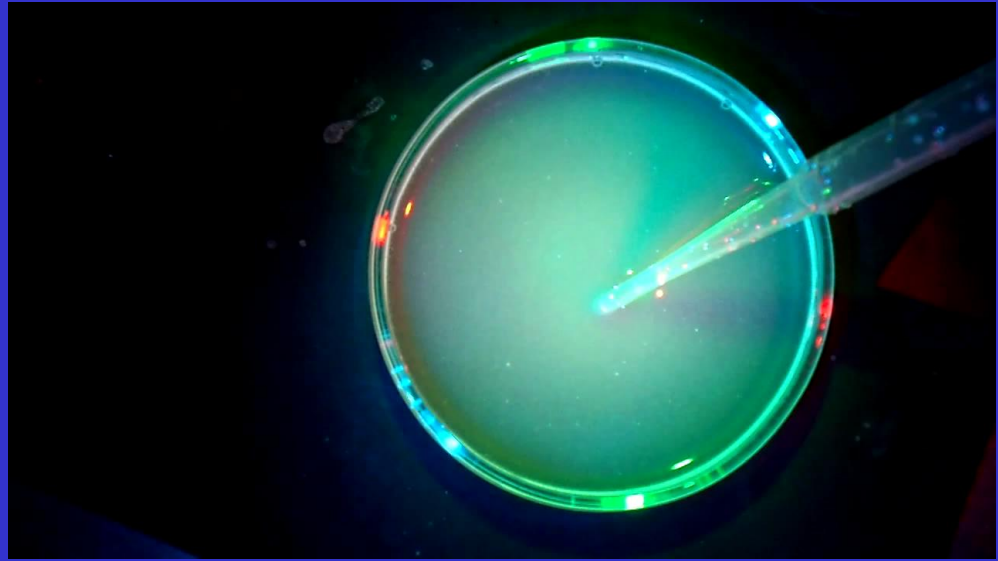
Thoroddson and Bauer, Phys. Fluids, **11** (1999) 1702.

Wilkinsson, Bezuglyy and Mehlig, Physics of Fluids **21**, 043304 (2009)

Visualization of particle orientation



Rheoscopic fluid

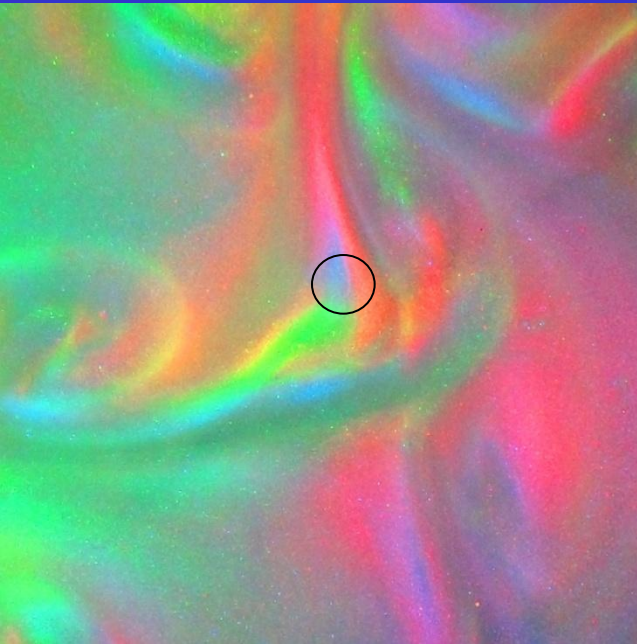


Latex beads

Macroscopic view:

How would a vortex been seen in the scattered light?

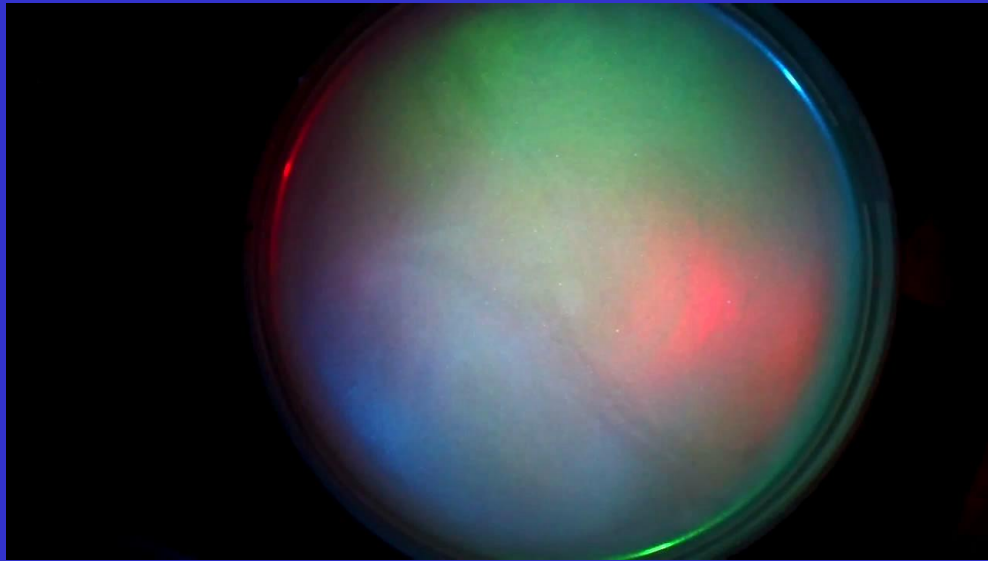
Friday 11.10 – 11.30 by Bernhard Mehlig



Microscopic view:

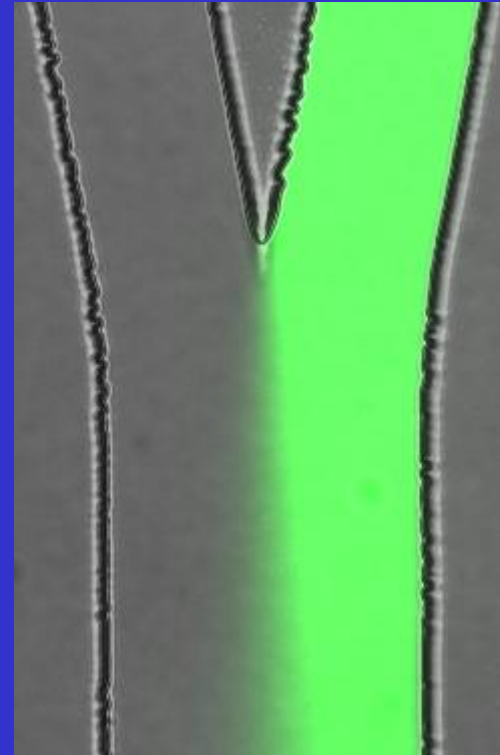
Investigate and control individual particles
Control of the flow

Macroscopic system



10 cm

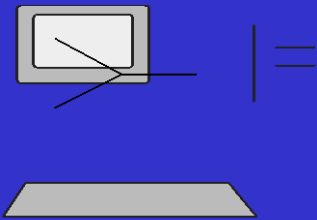
Microfluidic systems



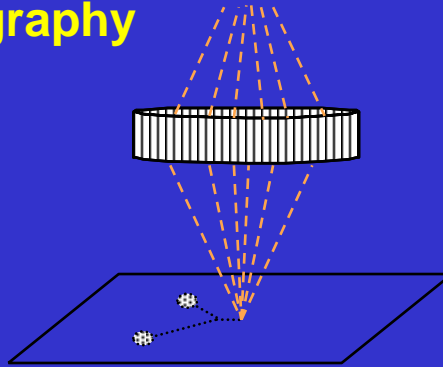
400 μm

Production of microfluidic systems

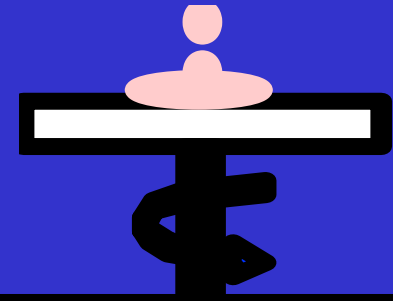
Mask: Pattern generation



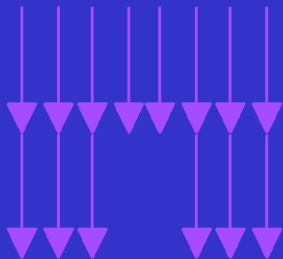
E-beam lithography
Mask



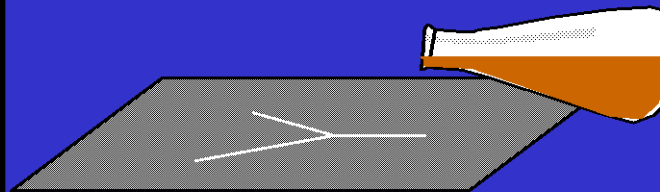
Spincoat negative photoresist



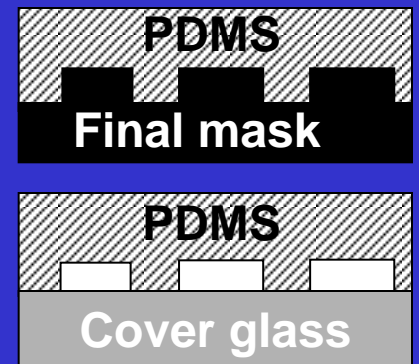
UV-expose through mask



Cure and develop: Photoresist mask

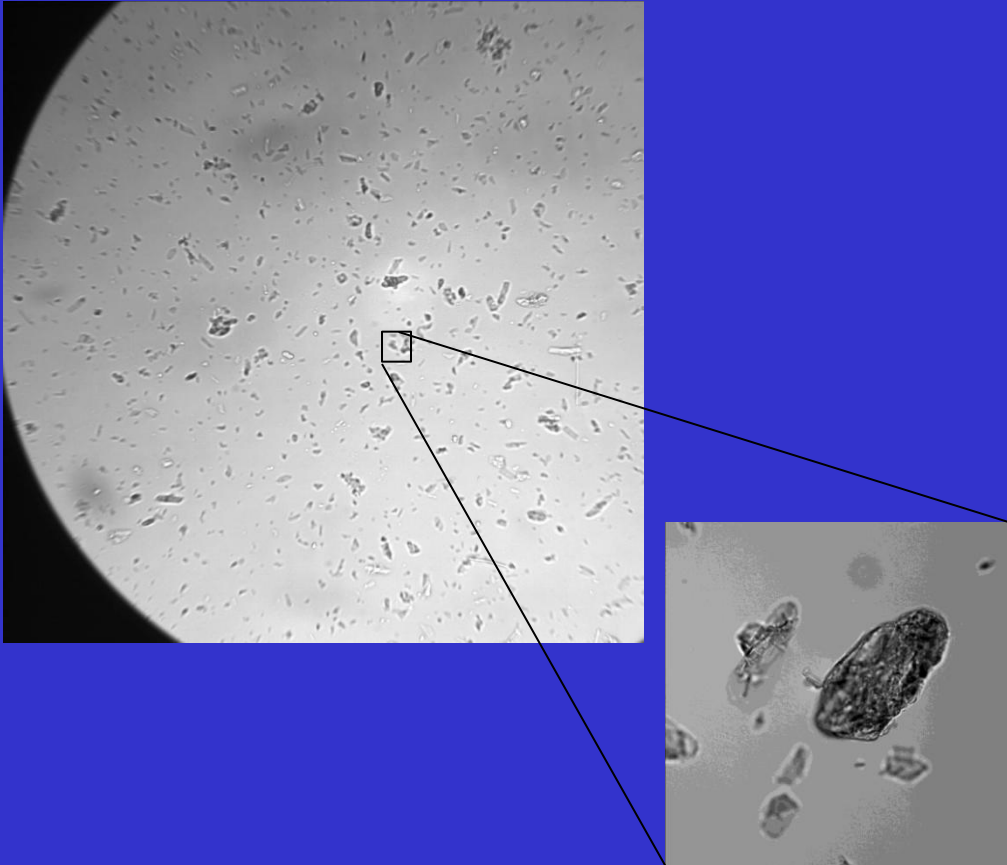


Moulding of PDMS sealing onto cover-glass

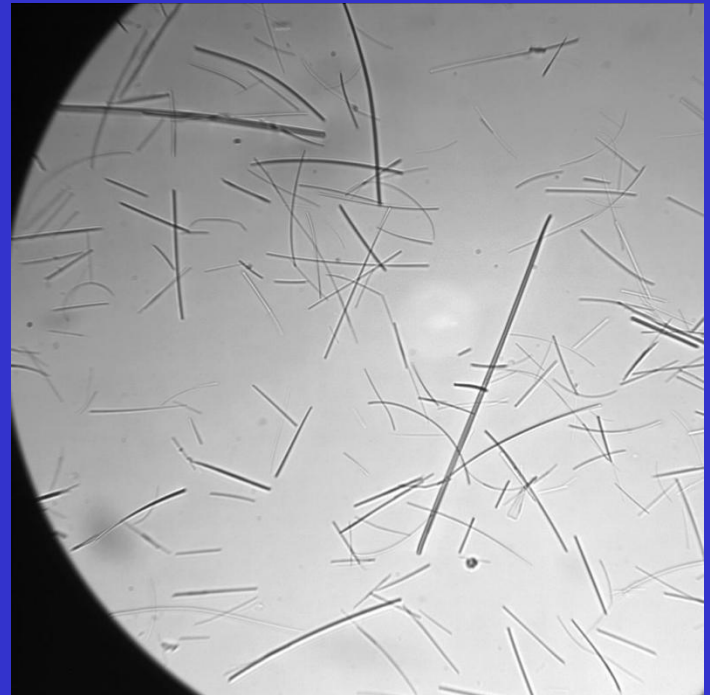


Size and shape of particles

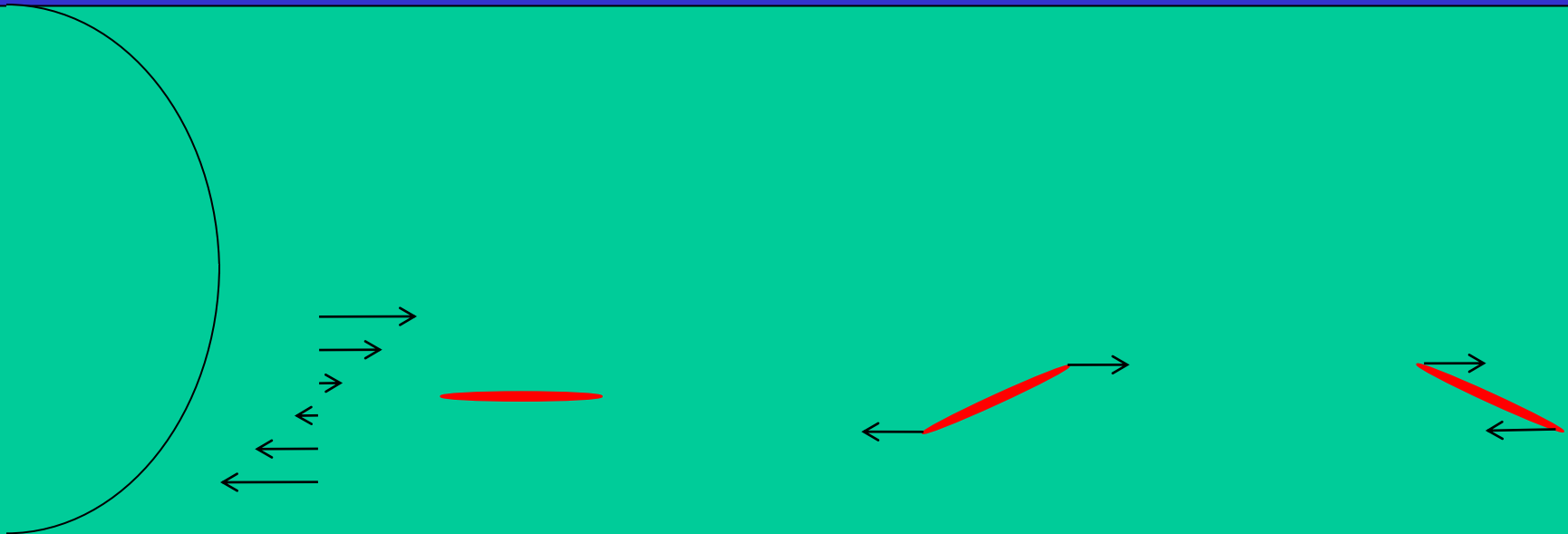
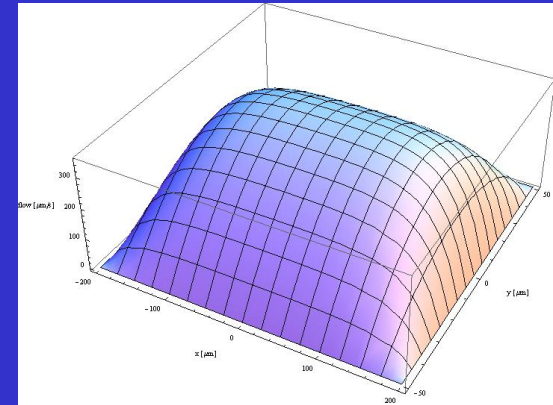
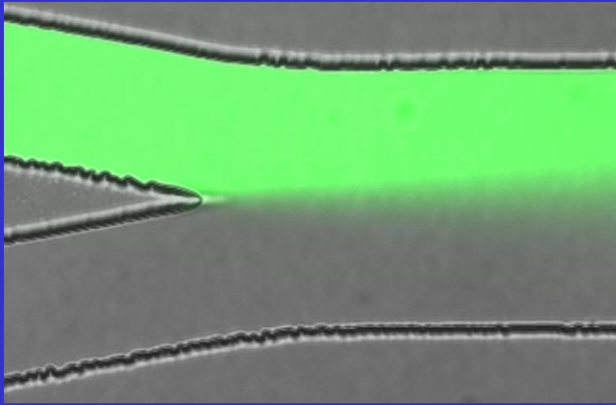
Commercial rheoscopic fluid
(fish shells)

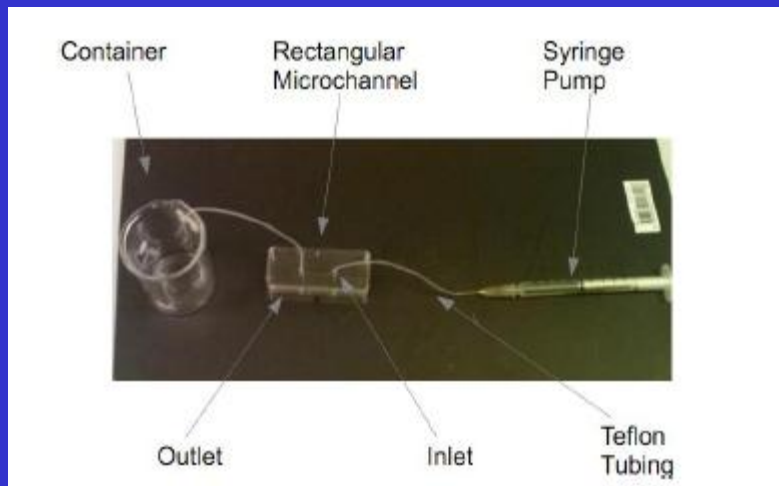
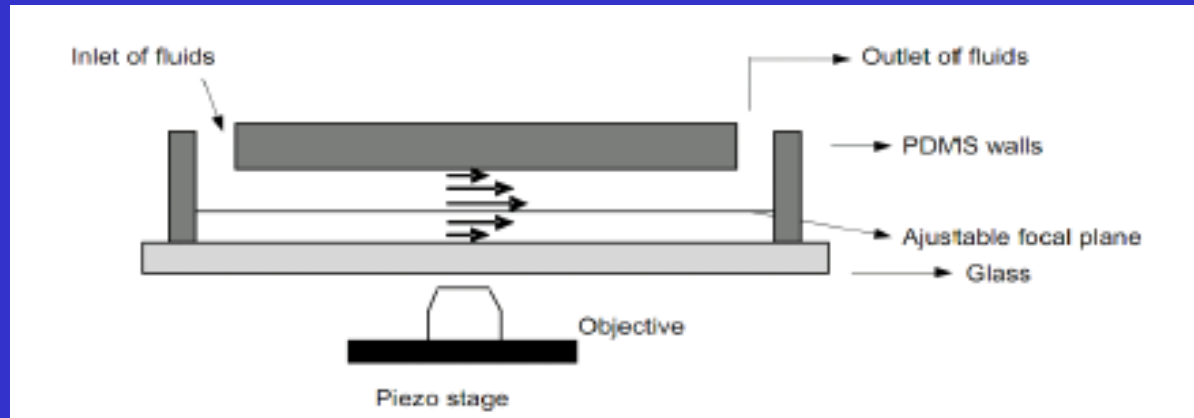


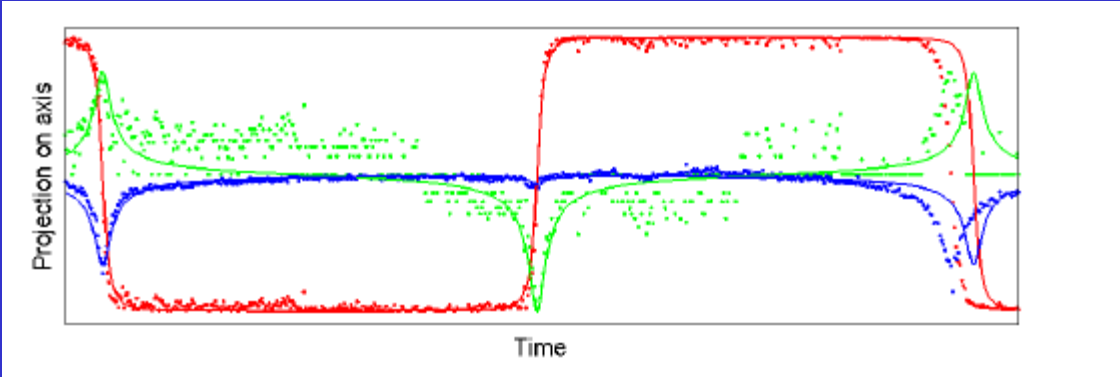
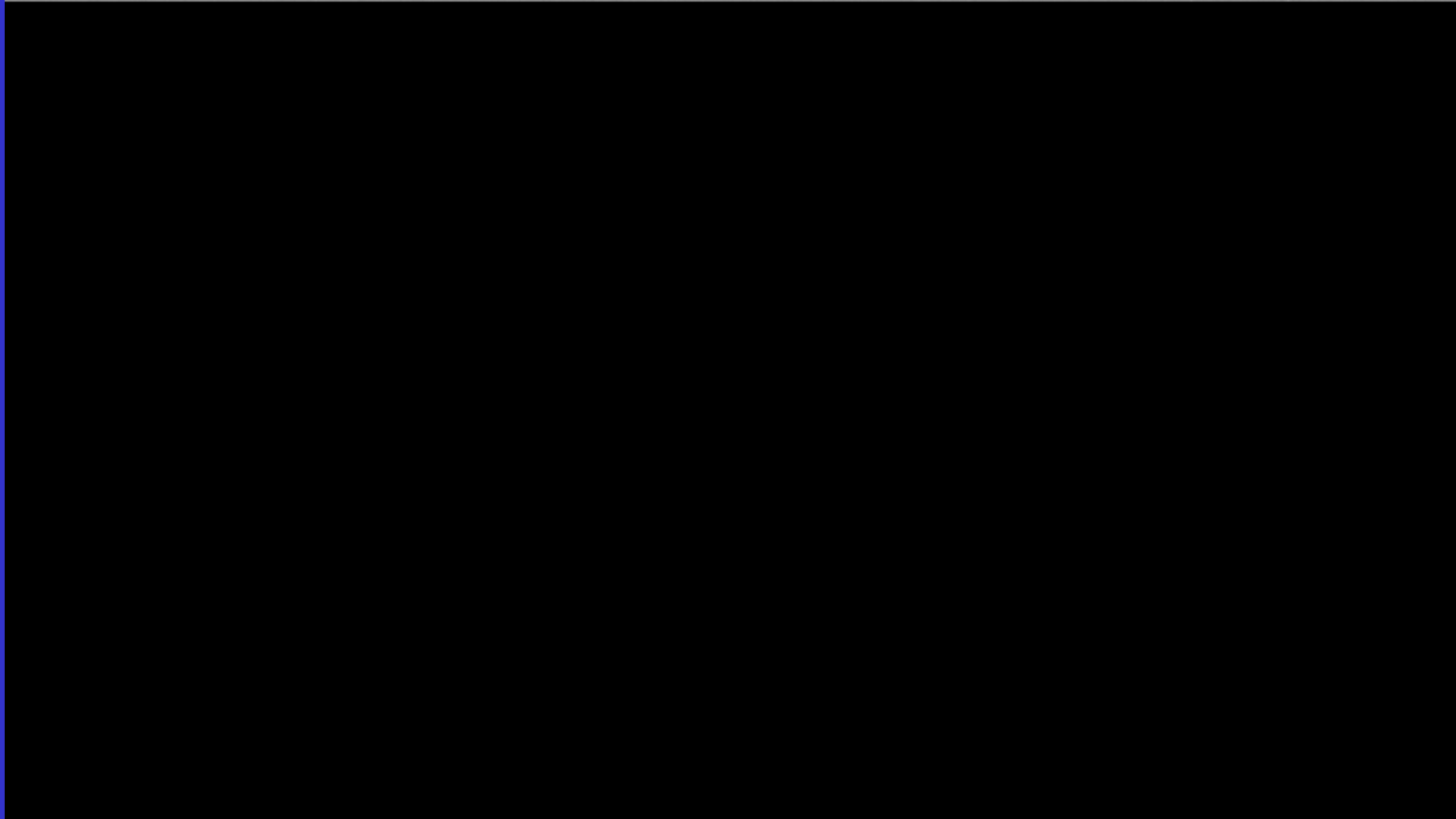
Synthesized polymer rods
(Epoxy in glycerol hardend in a shear flow)



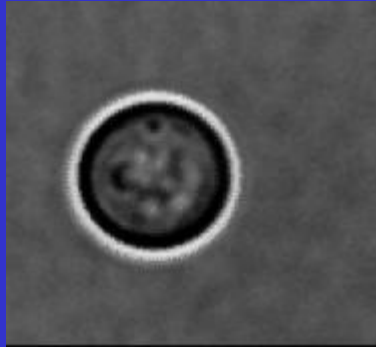
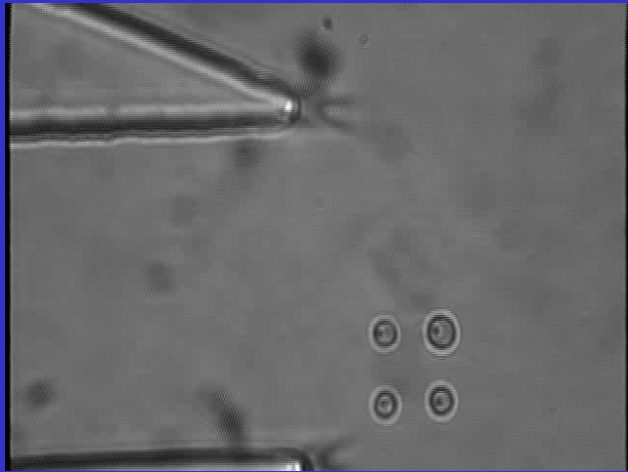
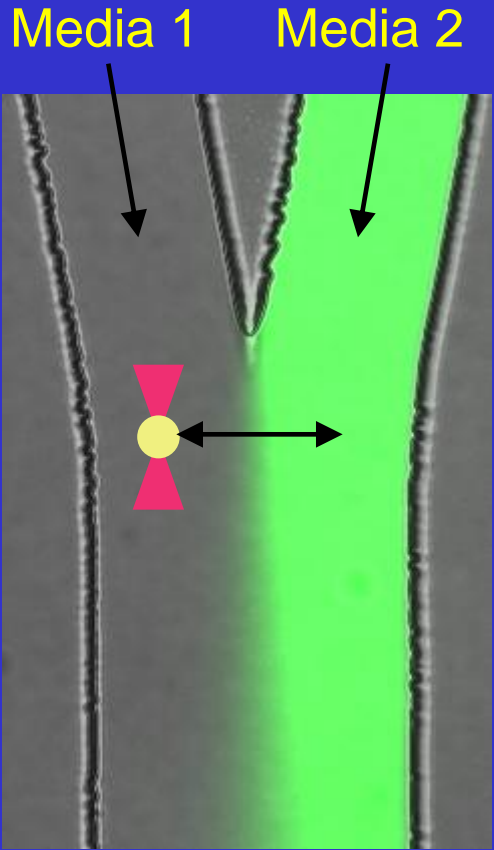
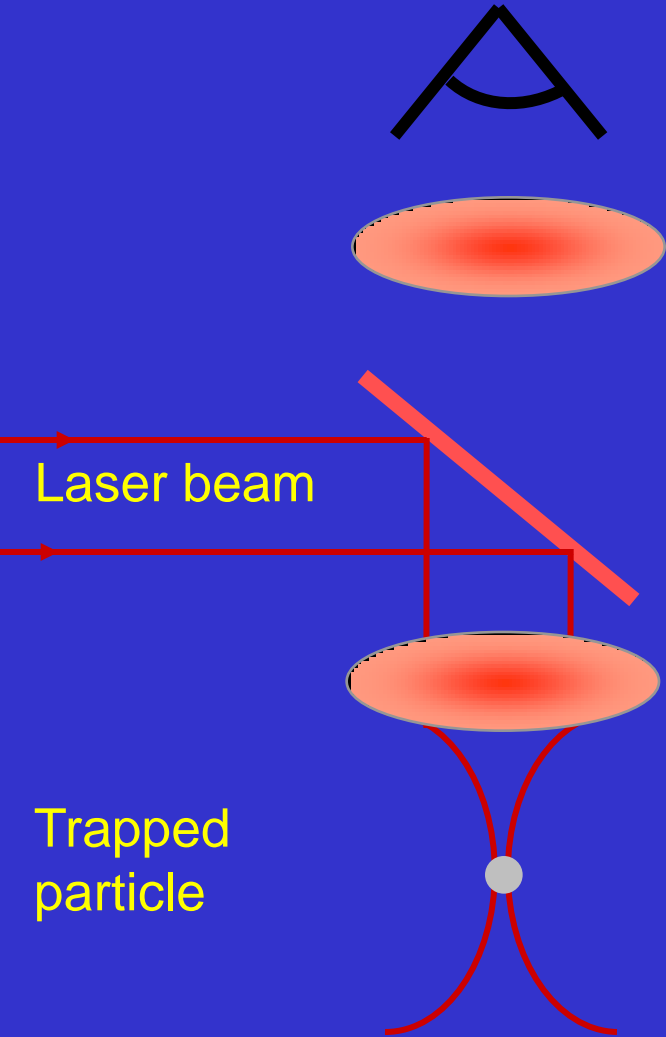
Dynamics of micro-rods in micro-fluidic channels







Controlling position in channel: The optical tweezers

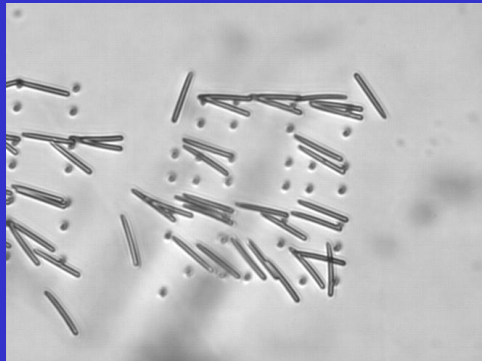


The future:

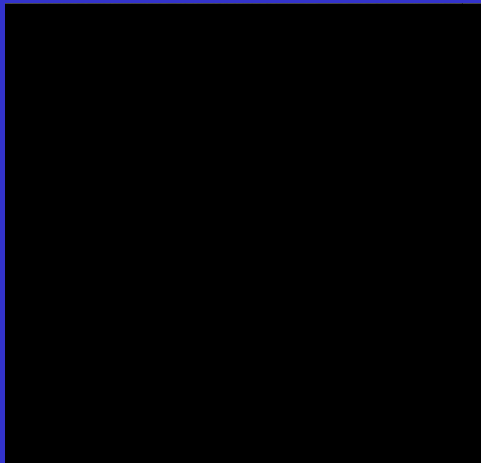
1. Homogen size and shape:

Laser induced photopolarisation

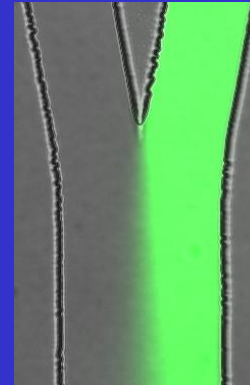
Ormos Pal, Lorand Kelemen, Szeged, Hungary



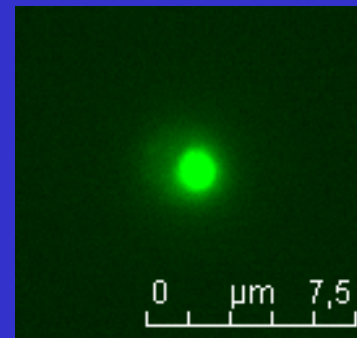
2. Position objects with Optical tweezers



3. Complex flow systems



4. Fluorescent rods



5. Automated tracking system

Acknowledgements

Experiment

Pontus Andersson

Oladiran Abiodun John

Anna Bjurbäck

Theory

Jonas Einarsson

Bernhard Mehlig

AND YOU FOR YOUR ATTENTION !!