

# WG 3: Nanomedicine, Nanodiagnosis and Nanosensing

*Peter Schön*

COST TD 1002  
Meeting Linz, 03 Feb. 2012

## WG 3: Nanomedicine, Nanodiagnosis and Nanosensing

- Cellular Mechanics; Stiffness probing using colloidal probe, further enhance the technique
- localizing receptors on membranes, proteins in tissue using Chemical Imaging: modified AFM tips;

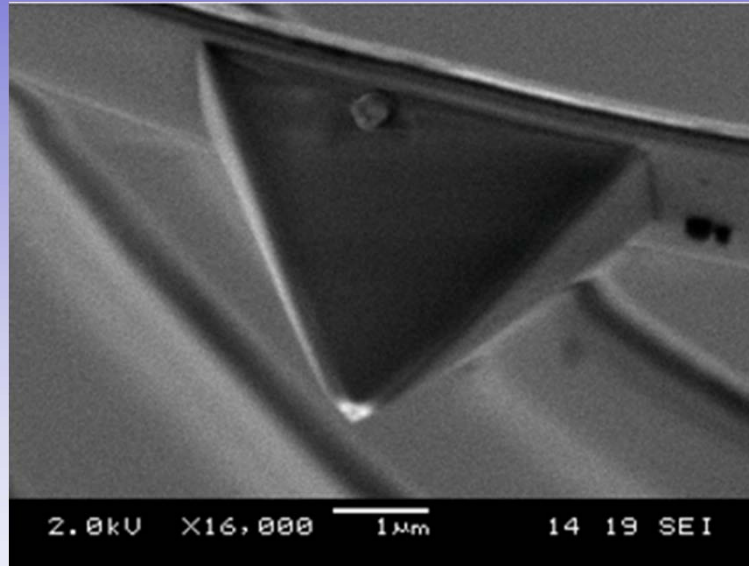
### *further develop*

- AFM combined with optical and fluorescence microscopy , esp. functional fluorescence
- Other combinations such as tip enhanced raman (TERS), electrochemistry, etc...
- AFM tip as sensor, for example to measure local pH, ATP concentration, temperature
- ...

## WG 3: Nanomedicine, Nanodiagnosis and Nanosensing

- Short Update: New members
- Novel Electrochemical Probes
- AFM for local delivery. Even therapy ?
- Nanomechanical Properties:
  - Is Friction interesting for medical applications?

# Novel electrochemical probes *“SmartTip”*

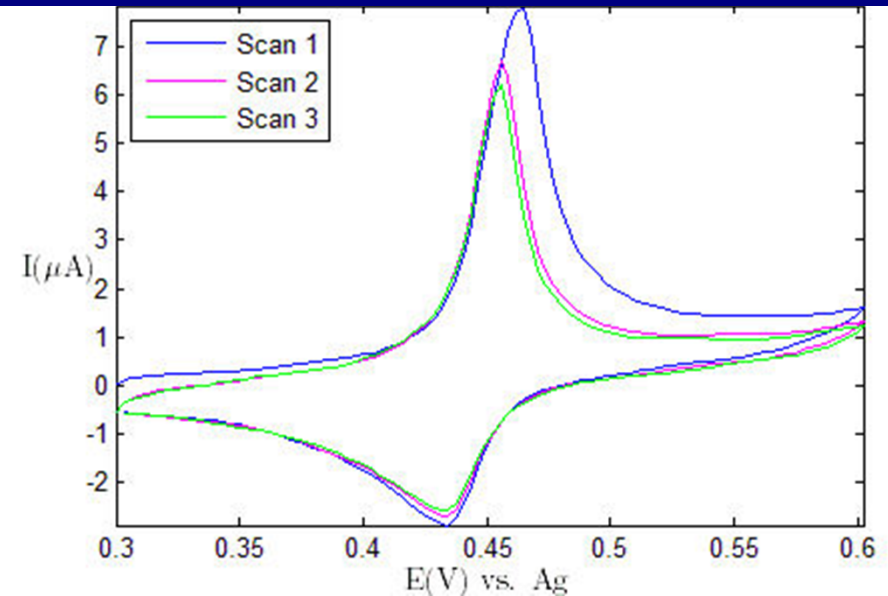
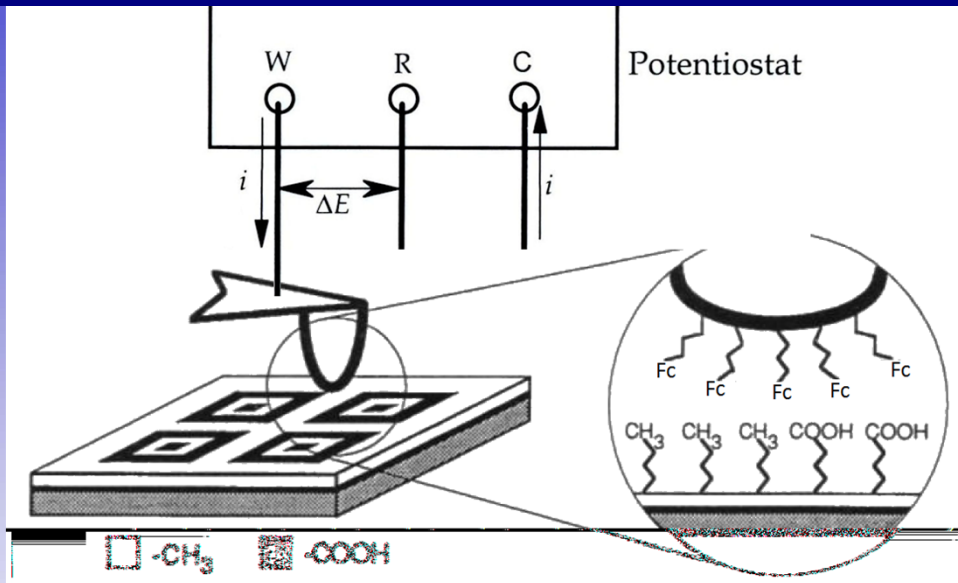


- simultaneous force and current measurement

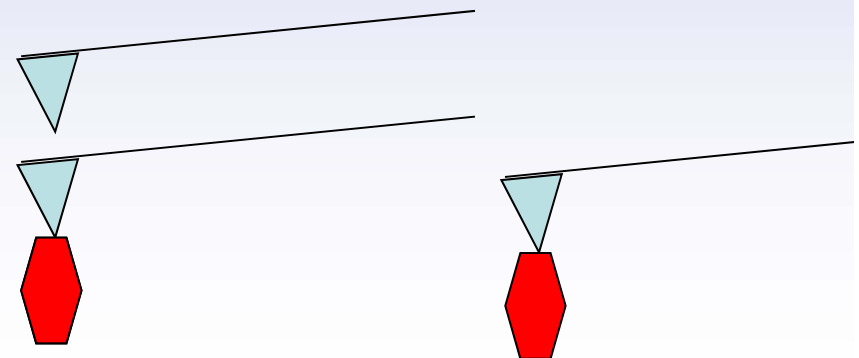
# AFM for local delivery

Is there potential for local therapy ?

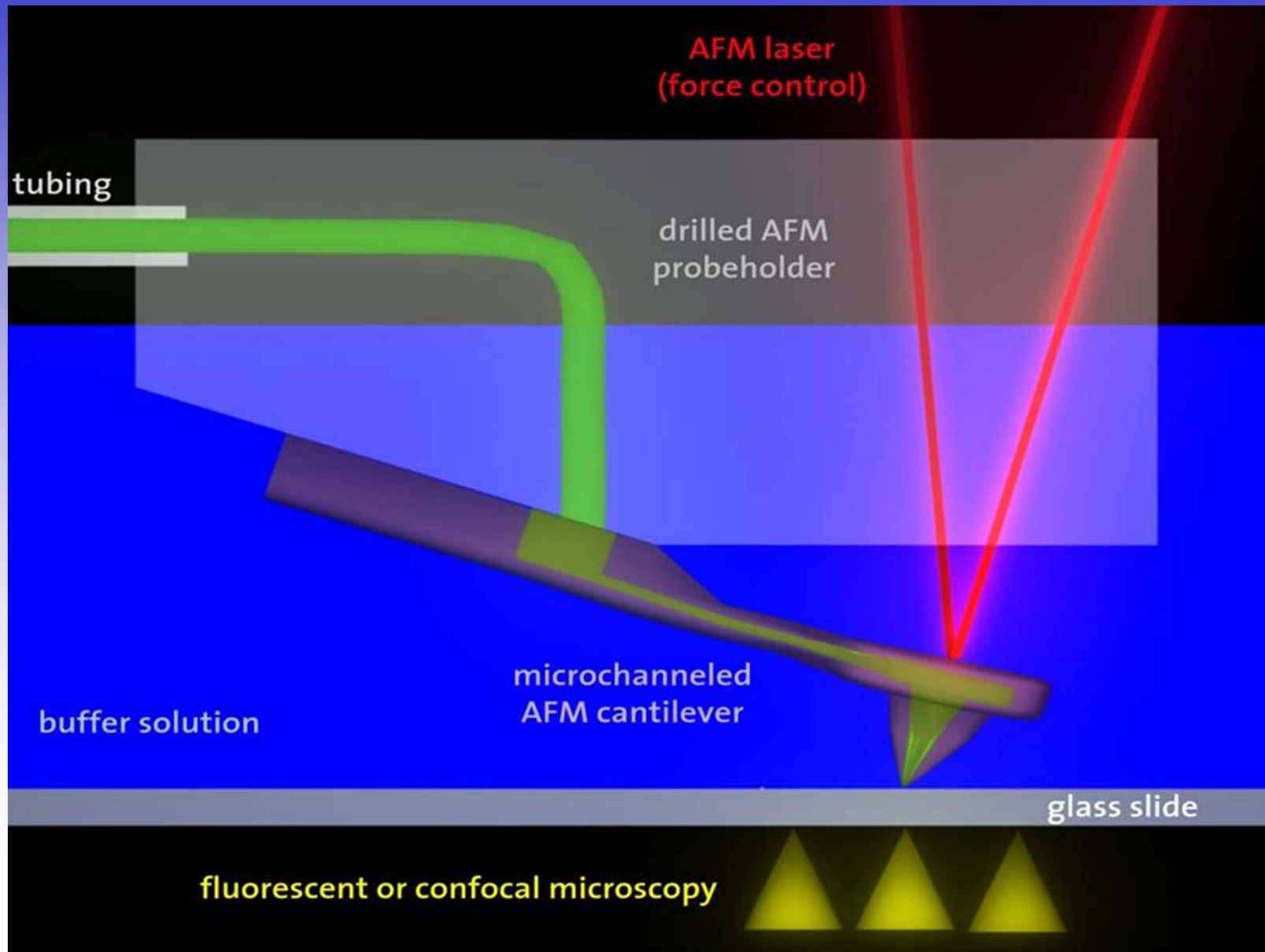
# Ferrocene modified AFM tip - switching adhesion



**~6 fold increase in adhesion force when ferrocene is oxidized at  $-\text{COOH}$**



[www.cytosurge.ch](http://www.cytosurge.ch)



# Applications

- Pick-up of microscopic objects.
- Displace cells by applying a small underpressure
- Intracellular Injection with force control.
- Penetrate membranes of viable cells and inject any soluble molecule into the cell lumen.
- Deliver membrane permeable molecules to selected individual cells or subcellular structures.

[www.cytosurge.ch](http://www.cytosurge.ch)



# Nanomechanical Properties

**Is friction interesting for medical/bio applications?**

- **Colloidal probes can be used**
- **Quantitative measurements with high resolution**
- **Calibration is complex**
- **Model system: polymer brushes**