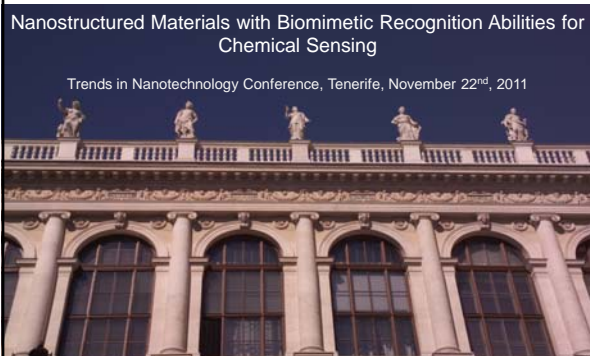


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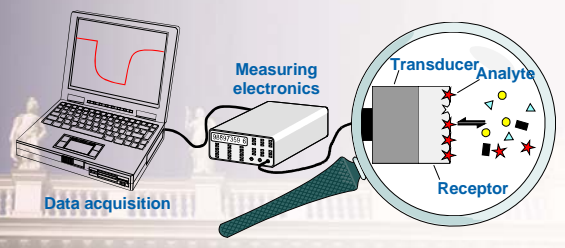
**Nanostructured Materials with Biomimetic Recognition Abilities for Chemical Sensing**

Trends in Nanotechnology Conference, Tenerife, November 22<sup>nd</sup>, 2011




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**What is a Sensor?**



Data acquisition    Measuring electronics    Transducer    Analyte    Receptor

P. A. Lieberzeit, TNTConference, Tenerife, Nov. 22<sup>nd</sup>, 2011


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**Manufacturing QCM**



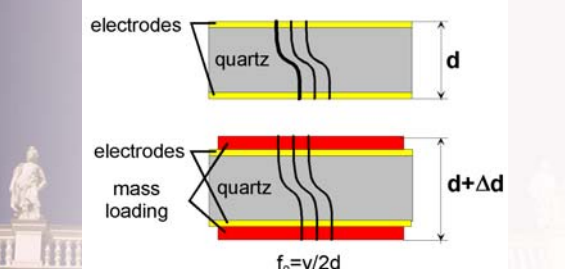
**Basis: Quartz blanks (AT-cut), 168 μm thick**

- ✓ Cleaning
- ✓ Screen-printing of the desired electrode pattern
- ✓ Burning of the electrode structures at 400°C

P. A. Lieberzeit, TNTConference, Tenerife, Nov. 22<sup>nd</sup>, 2011


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**QCM - The Sauerbrey Equation**




$f_0 = v/2d$

$\frac{\Delta f}{f_0} = \frac{\Delta d}{d} = \frac{\Delta m}{r A d}$

**$\Delta f = c \cdot f_0^2 \cdot \Delta m$**


P. A. Lieberzeit, TNTConference, Tenerife, Nov. 22<sup>nd</sup>, 2011


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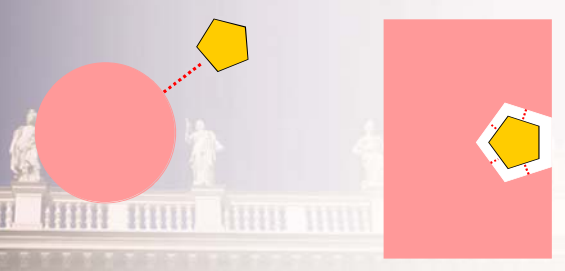
**Motivation**

- Natural systems are outstanding in terms of **recognition and regeneration**.
- **But:** **limited ruggedness**, sometimes high cost.
- **Therefore:** Implement **biological functionality** into artificial materials.

P. A. Lieberzeit, TNTConference, Tenerife, Nov. 22<sup>nd</sup>, 2011

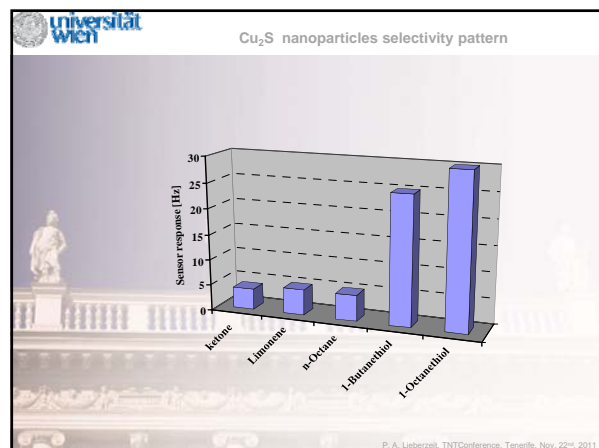
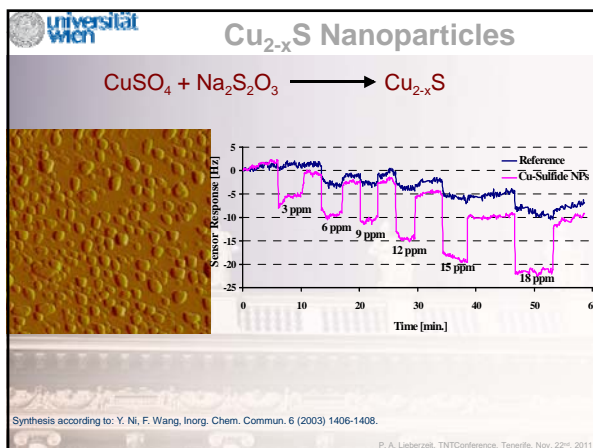
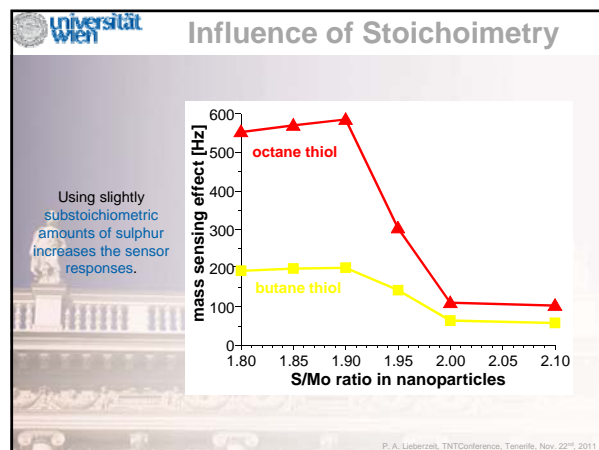
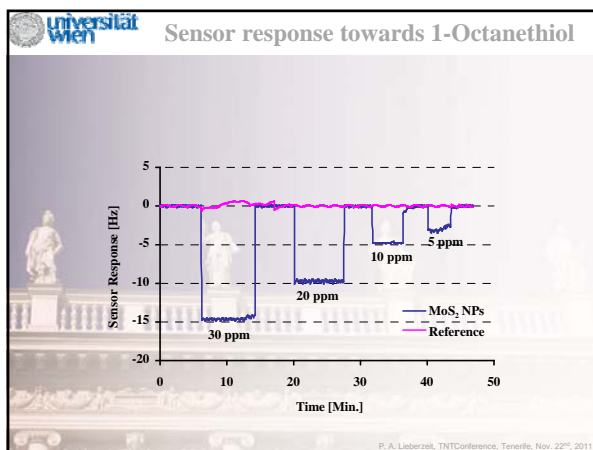
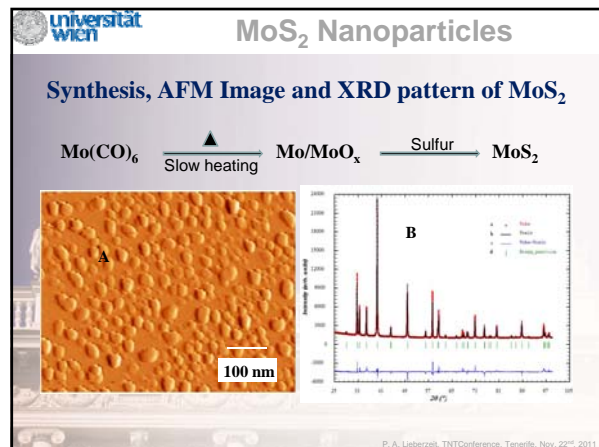
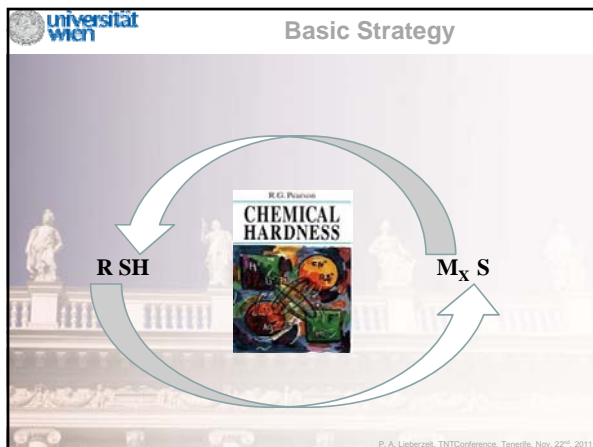

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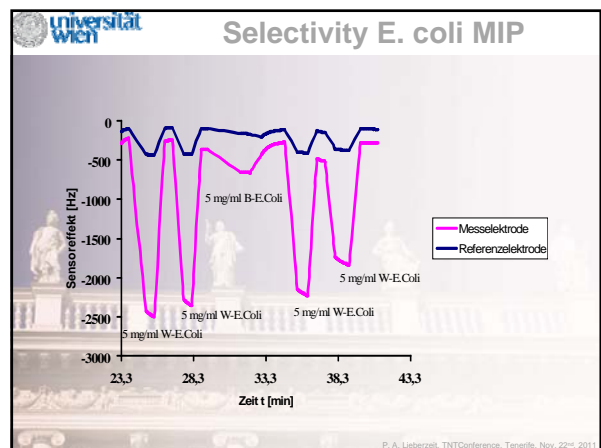
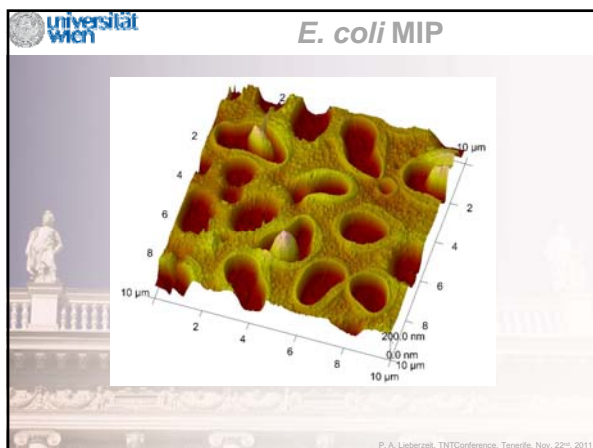
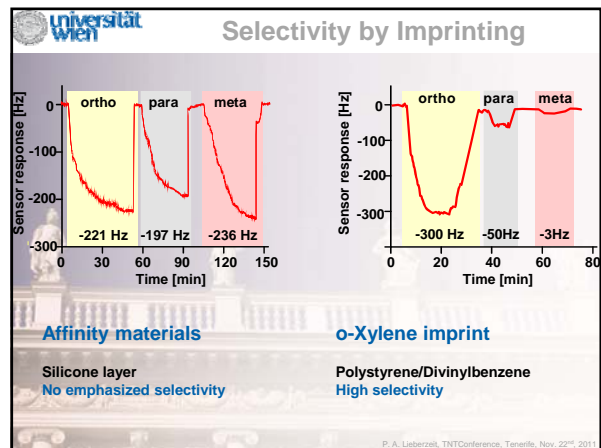
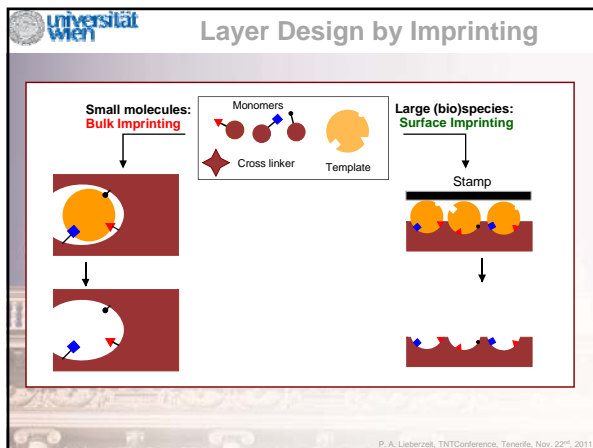
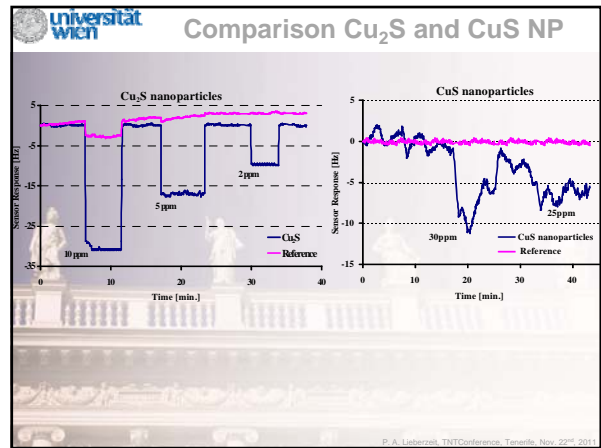
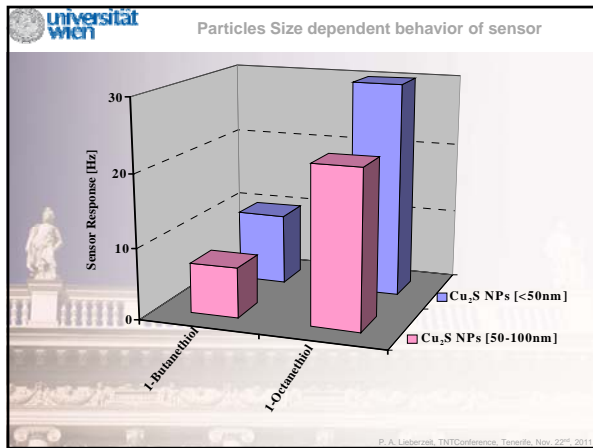
**Recognition Strategies**

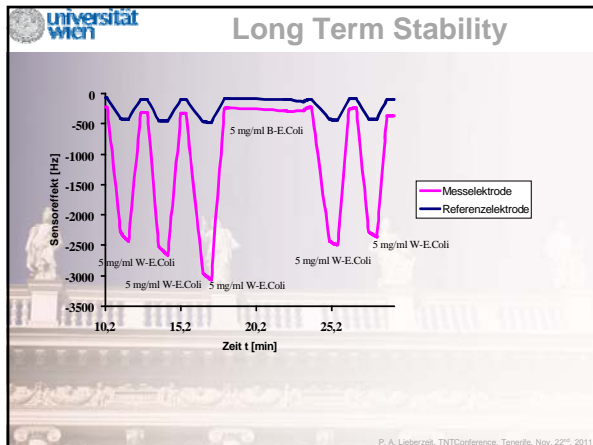


Outer plane – „concave“      Incorporation – „convex“

P. A. Lieberzeit, TNTConference, Tenerife, Nov. 22<sup>nd</sup>, 2011



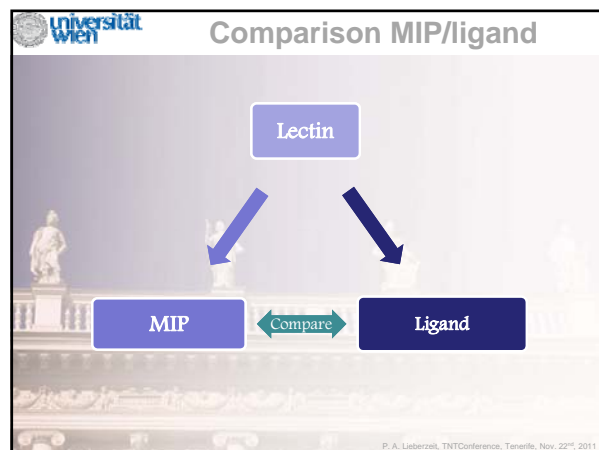
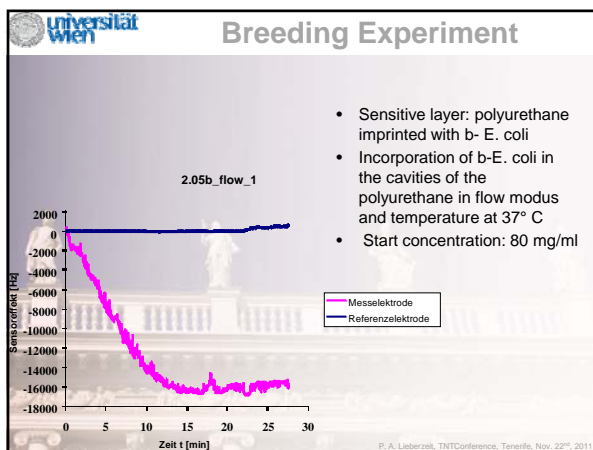




### Bioreactor Measurements

**Bioreactor**

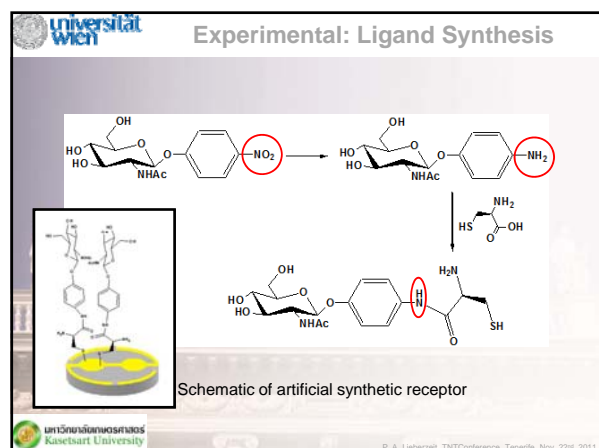
- Cultivation of microorganisms under optimal conditions
- important parameters: the composition of the nutrient, oxygen supply, sterility, pH and temperature-controlled and controllable
- Sensors measure these parameters directly in the exhaust air or in the culture medium
- Process flow assessed

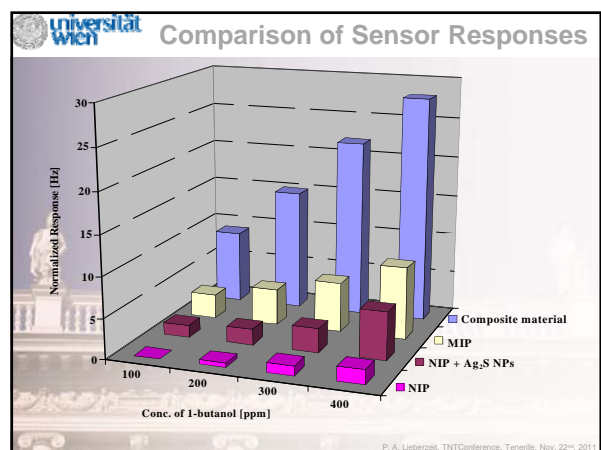
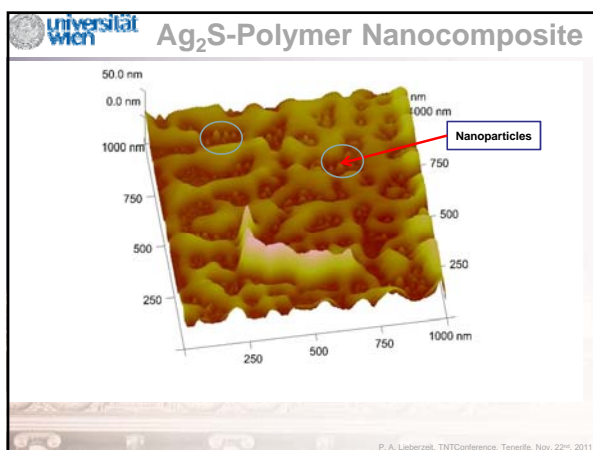
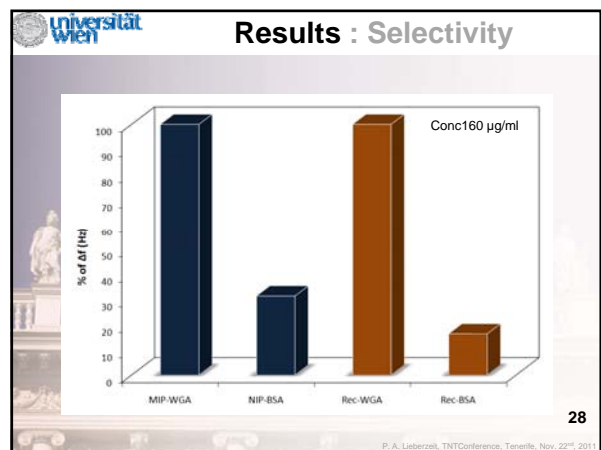
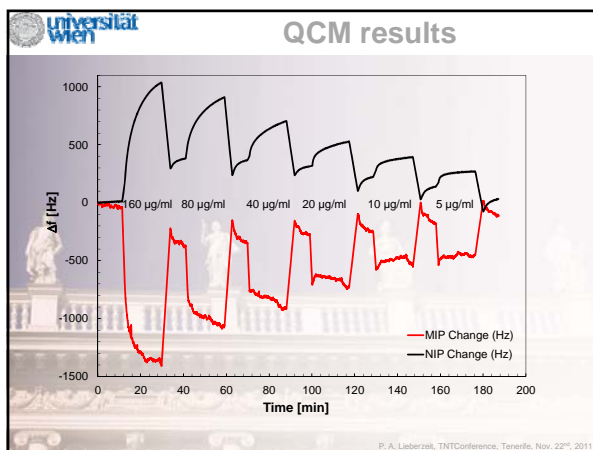
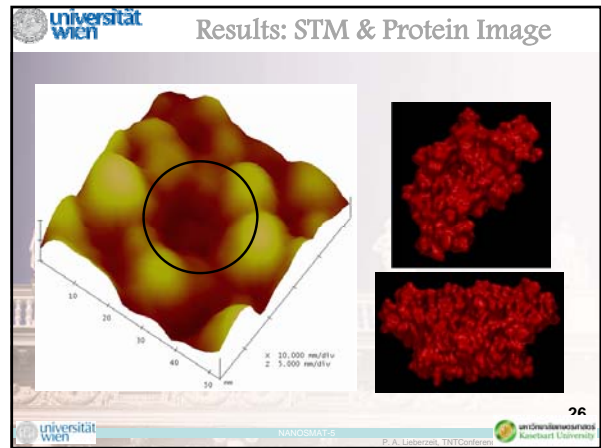
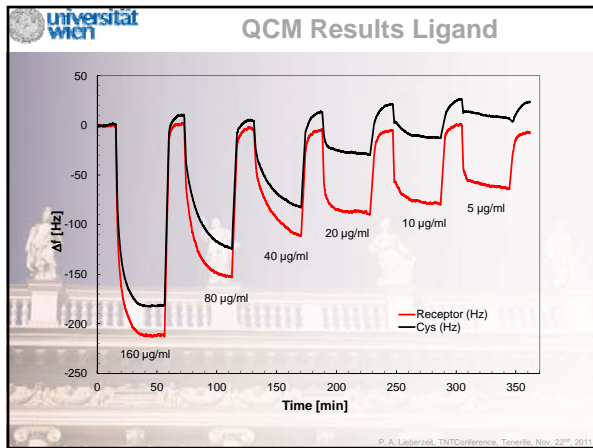



### Lectins

- Glycoprotein
- Specific binding to oligosaccharide
  - Mannose
    - ConA, LCH, GNA
  - Galactose/N-acetylgalactosamine
    - RCA, FNA, AIL, VVL
  - N-acetylglucosamine
    - WGA, SNA, MAL
  - Fucose
    - UEA, AAL
- Play important role in cells and viruses recognition.



<http://www.ebi.ac.uk/pdbe-srv/ViewEntry/Zuvc/quaternary.html>









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PhD Program 

P. A. Lelercq, TINT-Conference, Tenerife, Nov. 22<sup>nd</sup> 2014

