Nanosensors

Co-Chairs:

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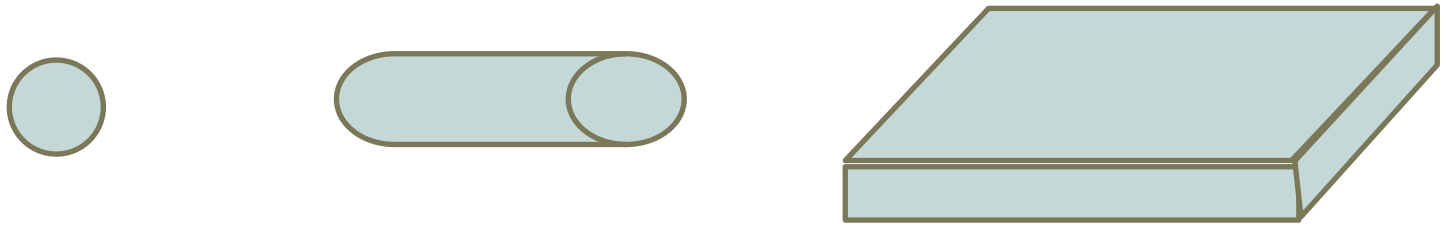
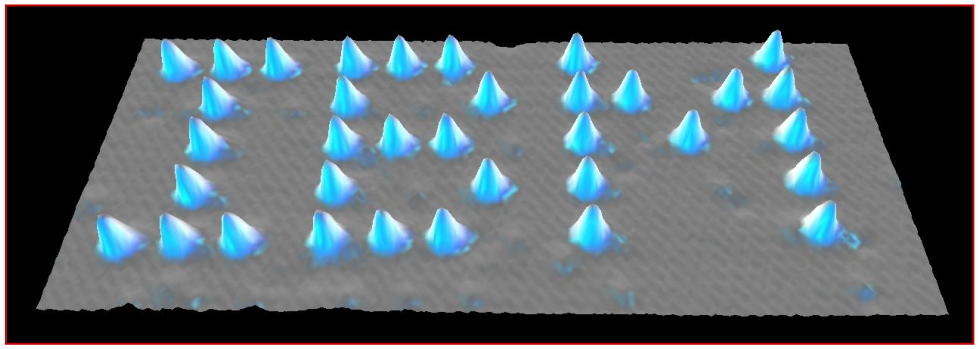
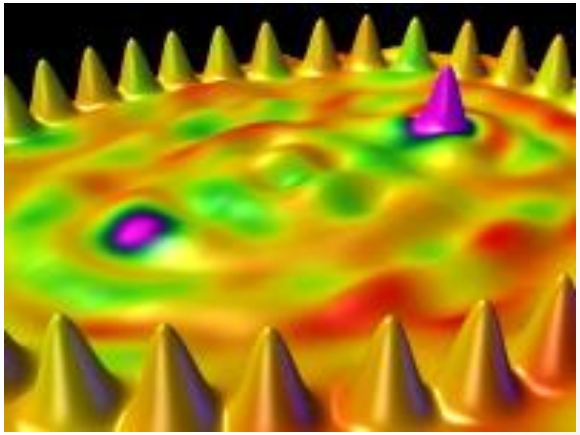
Introduction

- “Nano” - one dimension less than 100 nm in length



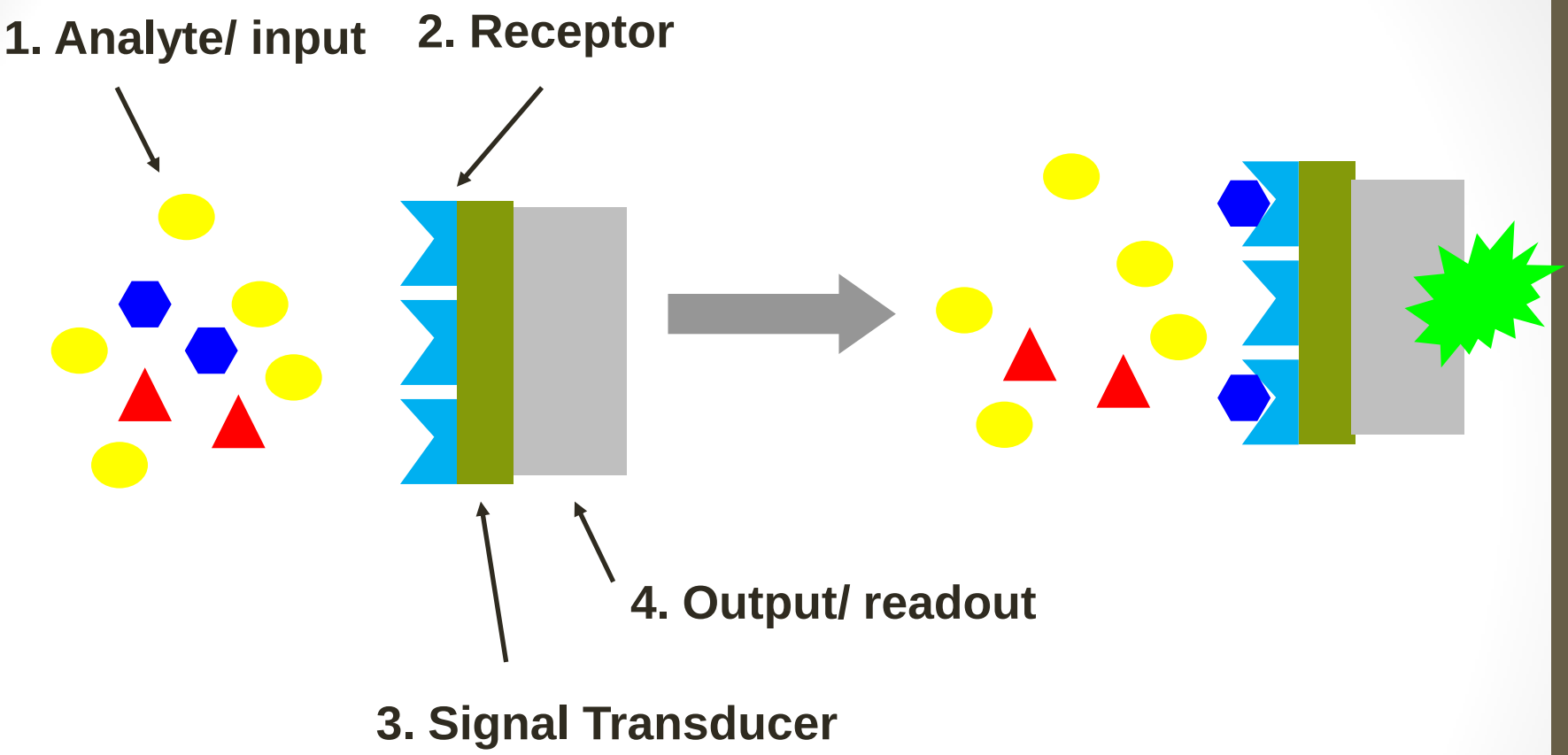
- Nanoscience has been driven by the increasing ability to measure and manipulate on the atomic scale.





- Naturally, given the importance of measurement and detection in the field, sensors are major application area.

Sensors

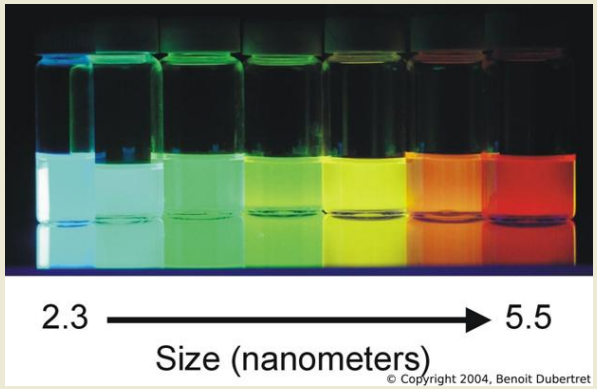


In the case of nanosensors the goals are:

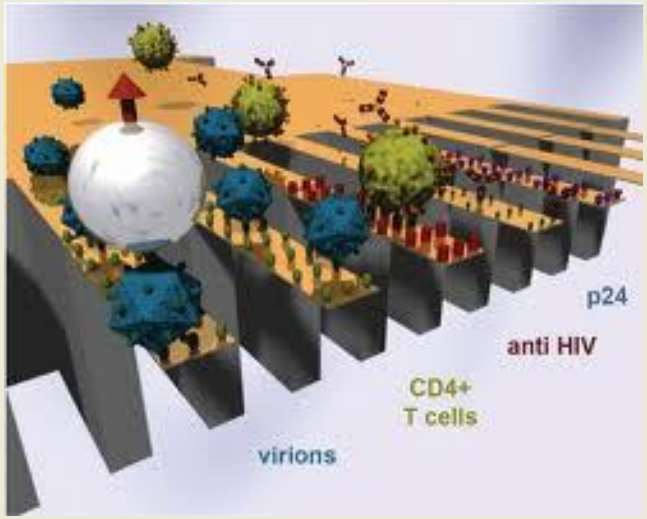
- Next generation of lab & industrial sensors (single molecule)
- Next generation healthcare for pharma and personalised medicine

Why nano? – Unique properties

Quantisation - Optical

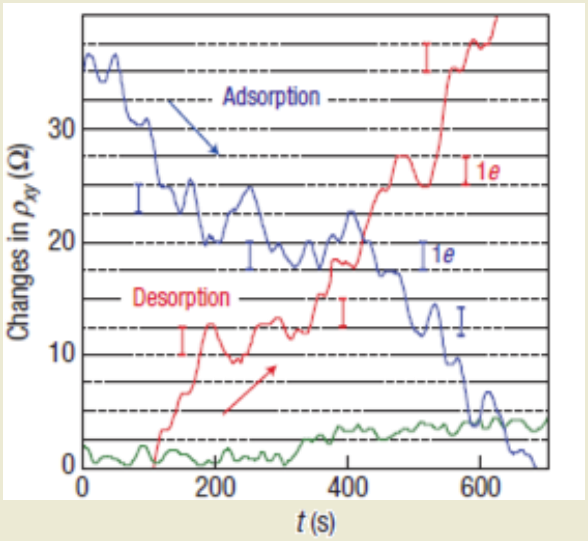


Vibrational resonance



London Centre for Nanotechnology

Electronic



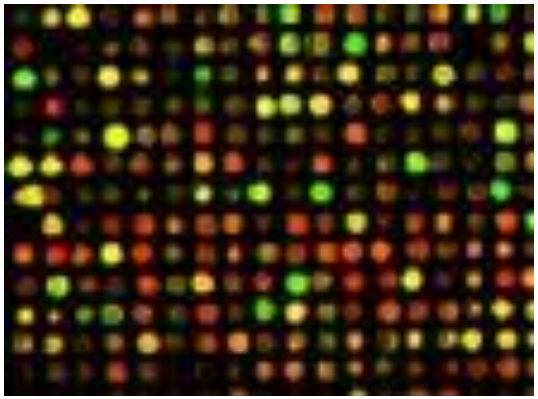
Schedin (2007). *Nature Materials*,

Why nano? - Size

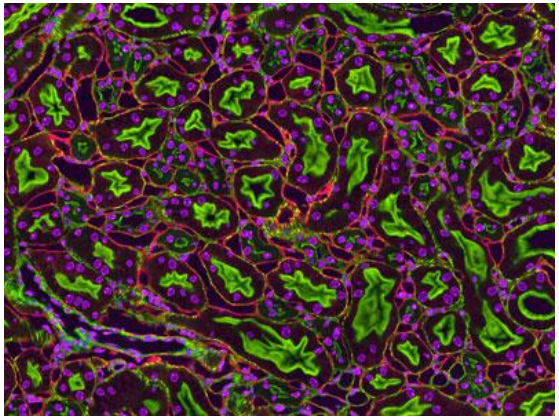
- Faster response time
- Lower analyte consumption
- Sensitivity
- Larger surface and contact areas
- Interface with biology, e.g. using DNA and protein aptamers to detect the signal
- Multiplexing (measuring multiple analytes simultaneously)

  ⇒ Lab on a chip
- Intracellular sensing

DNA/mRNA



Intra cellular



Challenges

- Selectivity
- Sensitivity
- Device design
  - New Materials
  - Fluid handling and behaviour
  - Array printing
  - Data handling and interpretation
- Production and scale-up
- Commercialisation

Programme

- *Nanofluidics and 2D Materials-Based Nanosensors*

  Ivan Vlassiouk, Oak Ridge National Lab

- *Development of Microfluidic Devices for High-Throughput Biological and Chemical Analysis*

  Andrew de Mello, ETH Zurich

********** CONFERENCE DINNER **********

- *Single Molecule Detection Systems in Clinical Diagnostics and Drug Screening*

  Fredick Höök, Chalmers University

- *Population-Based Comprehensive Health Monitoring for Combating Infectious Diseases and Bioterror*

  Conrad D. James, Sandia National Lab