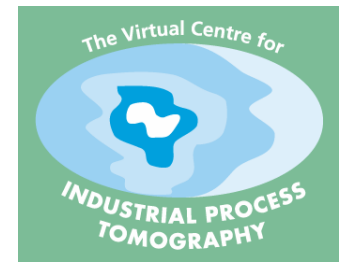


Miniature Electrical Tomography for Process Monitoring



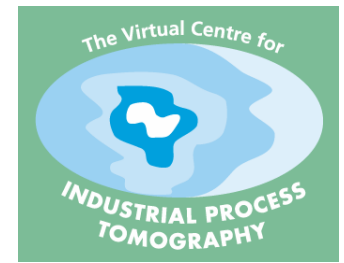
Trevor York

**Sensing, Imaging and Signal Processing Group,
School of Electrical & Electrical Engineering,**

University of Manchester

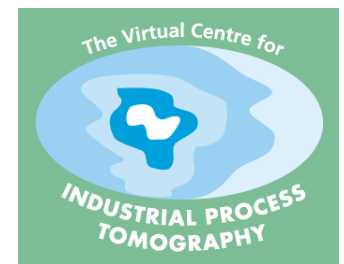
t.a.york@manchester.ac.uk

Tomography



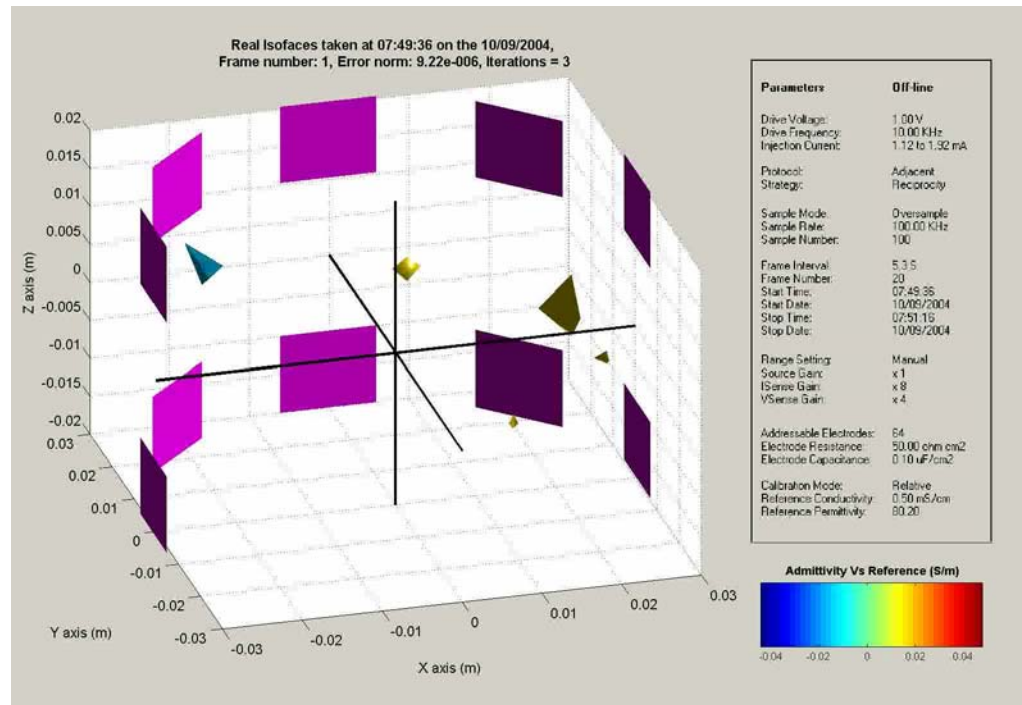
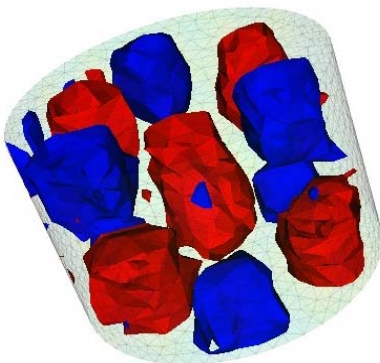
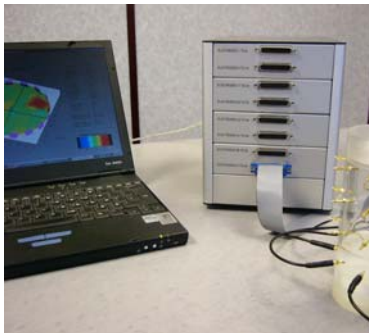
- **Process tomography aims to determine the distribution of materials in a vessel using non-intrusive measurements around the boundary**
- **Electrical modalities have emerged as a powerful technique**
 - resistance, capacitance, inductance
- **Applications : two-phase flow, mixing, pressure filtration, bubble columns, hydrocyclones, pneumatic conveying, polymerisation, fluidised beds,**
- **Typically centimetres to metres**
- **For instance see :**
 - Proc. World Congress on Industrial Process Tomography**
(1999, 2001, 2003)

Instruments

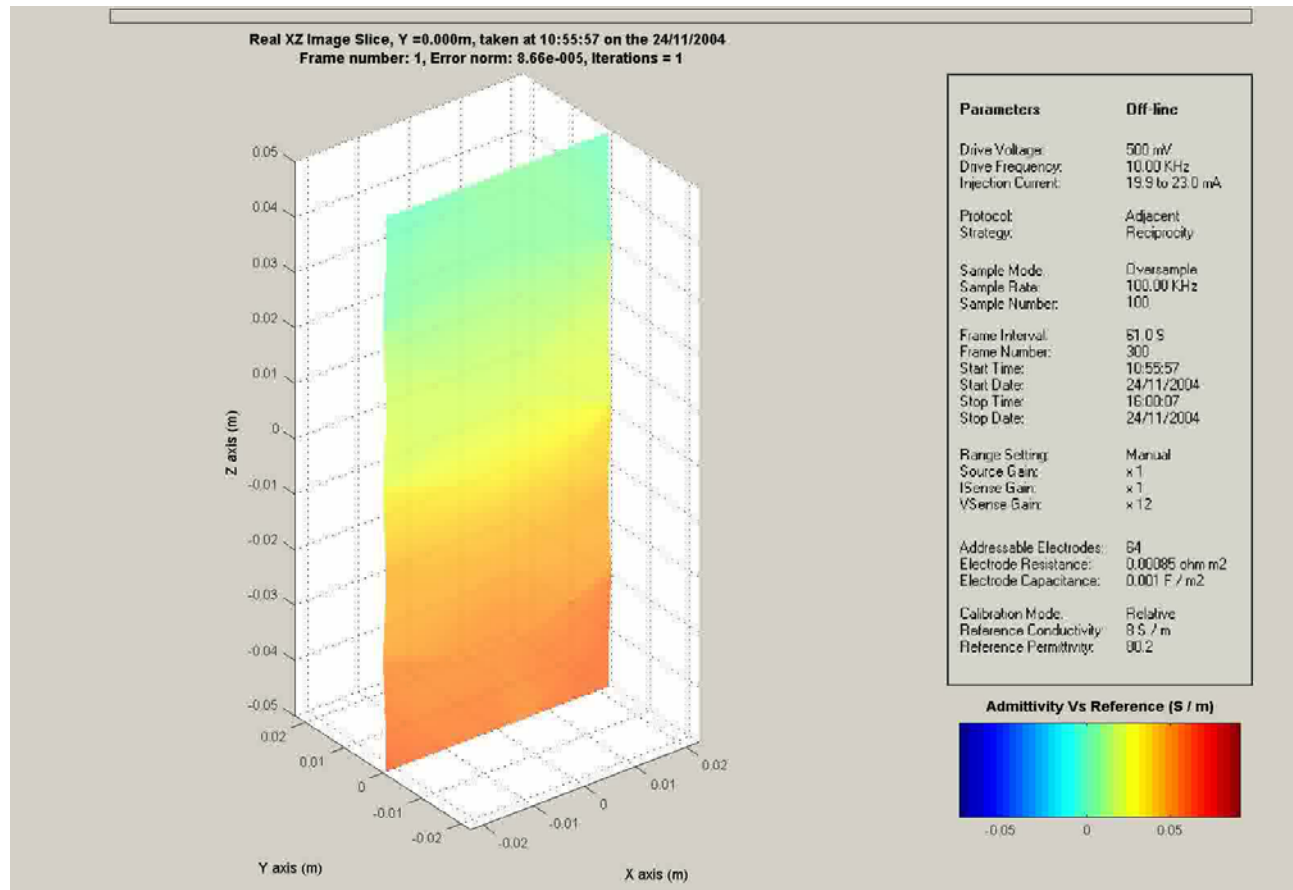
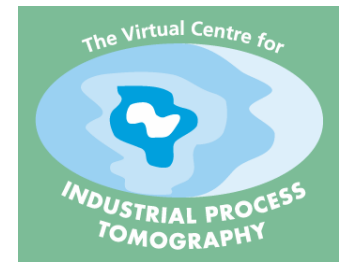


Variety of instruments : ITS, PTL,.....

LCT recently available - low cost, modest dynamics, 3D



e.g. : Sedimentation/Ageing



Some Miniature Possibilities



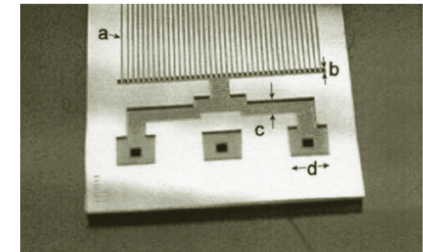
aerosol



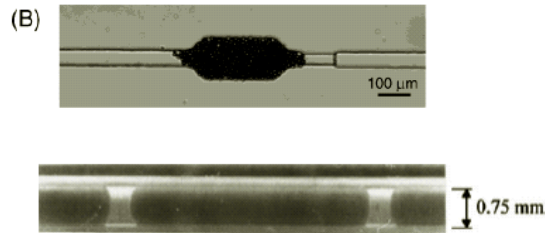
inkjet



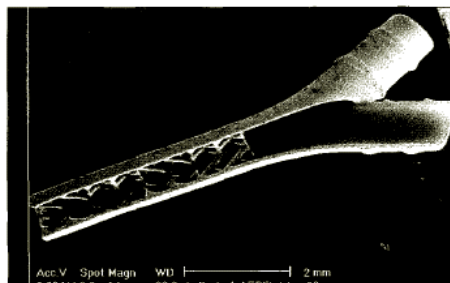
inhaler



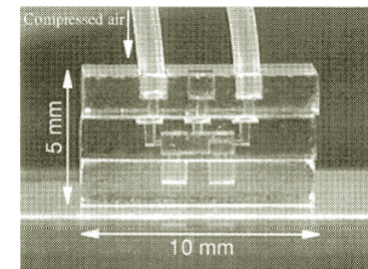
micro-reactor



microfluidics

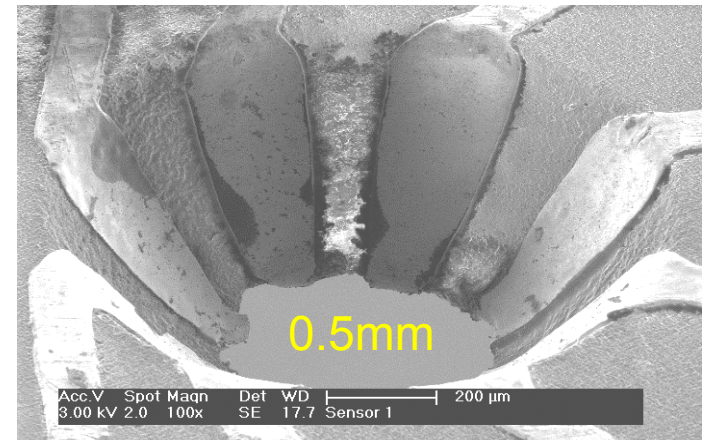
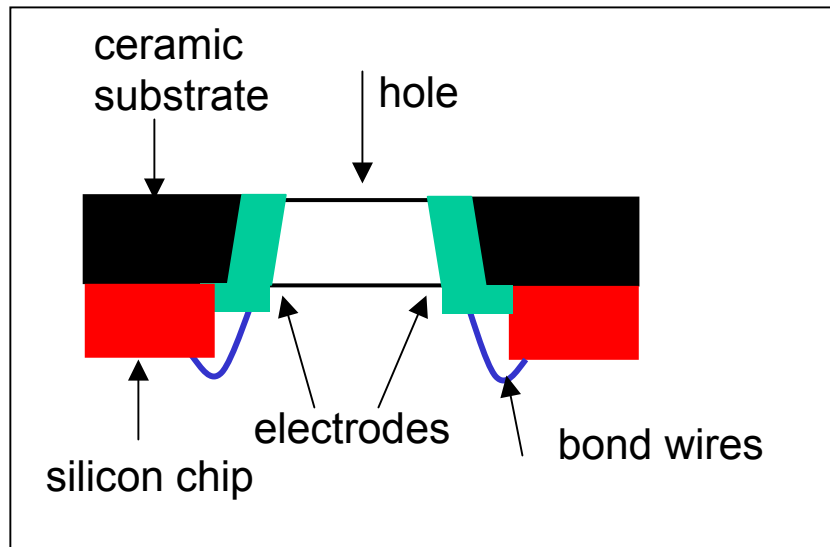


micro-mixer

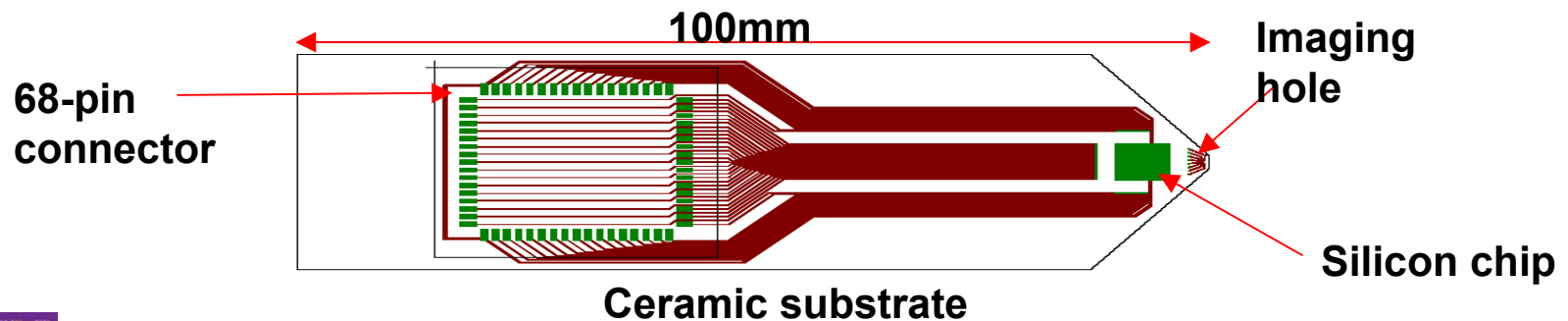


(a)

Electrodes on Ceramic



Acoustically drilled hole



Miniature Electrical Tomography

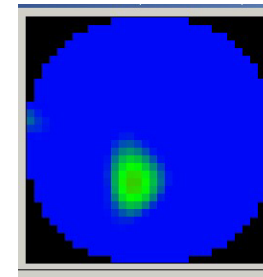
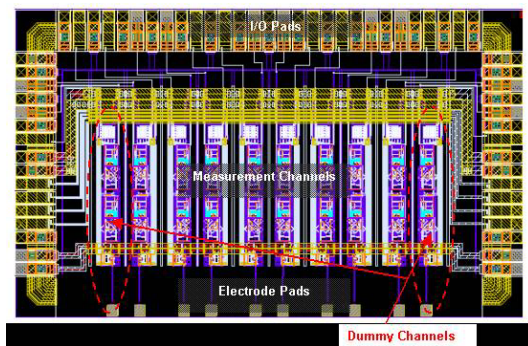
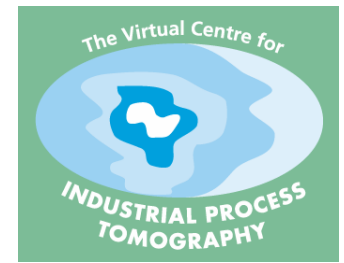
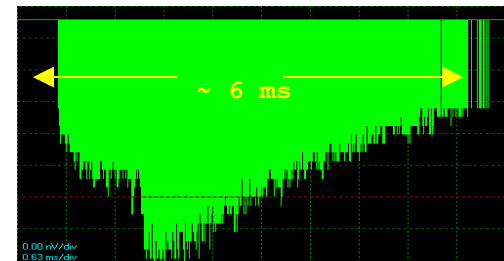
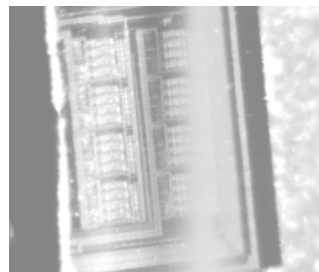


image of a 0.2 mm object

Chip Size : 4.1mm x 2.5 mm

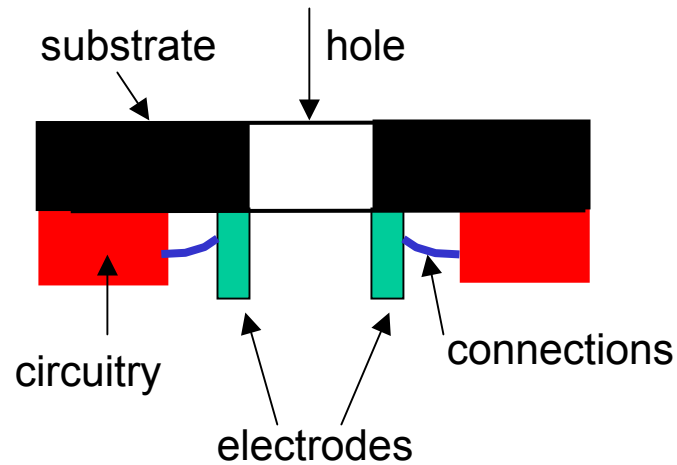
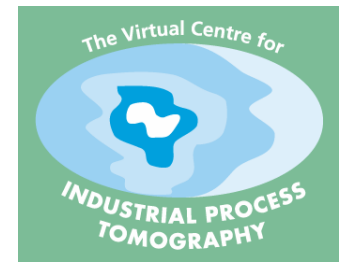
Timing resolution : 1 μ s

→ ← 0.3mm



spray detection

The Future - it ain't necessarily round



**Electrodes on silicon
reduce parasitics**

