

**SINTEF** Technology for a better society

Trondheim  
Oslo

An Introduction to the  
**SINTEF Group and SINTEF ICT**

SINTEF ICT

**SINTEF ICT**

A RTD in the SINTEF Group  
www.sintef.no phone: +47 7359 3000

- Staff
- Informatics and Mathematics
  - Applied Mathematics
  - Cooperative and Trusted Systems
  - Software Engineering, Safety and Security
- Control and Communication Systems
  - Acoustics
  - Communication Systems
  - Applied Cybernetics
- Micro- and Sensor Systems
  - Micro and Nano Technology
  - Optical Measurement Systems and Data-analysis
  - Instrumentation and Microelectronics

SINTEF ICT

**Optical Measurement Systems and Data Analysis**

Machine vision  
Optics  
Data analysis

25 employees, 20 in Oslo  
Revenue 35 MNOK  
60 active projects

SINTEF ICT

**MicroOptics ( $\mu$ Optics) – Minitized Optics Technology and Products**

- Tomra Recycling Center
- CO<sub>2</sub>-sensor for ventilation control
- MicroOptoElectroMechanical System (MOEMS) diffractive filter
- Skin cancer diagnostics
- Gene technology
- Micro optical microphones
- Food quality. Food quality tracing and monitoring

SINTEF ICT

**Gas measurement for space**

- Simultaneous detection of many (~30) trace gases
- FTIR-based spectrometry
- Advanced statistical calibration
- Simple and fast runtime analysis software
- Sent to the International Space Station by the space shuttle Endeavour STS-118 10. august 2007.

European Space Agency/NASA

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**Gas measurements for space**

- Simultaneous detection of many trace gases
- FTIR-based spectrometry
- Advanced statistical calibration
- Simple and fast runtime analysis software
- 'Won NASA gas measurement contest'

**NASA Astronauts at SINTEF ICT**

April 13th 2007 the NASA astronauts Mark Polansky and Nicholas Patrick inspected the gas measurement system (ANITA) at SINTEF ICT in Oslo.

Sent to the International Space Station by the space shuttle Endeavour STS-118 on the August 10th 2007.

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## Recycling in a worldwide market



**TOMRA produces the industry-leading Reverse Vending Machines**



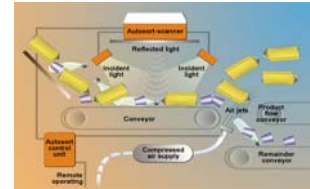
SINTEF's contributions include solutions for:

- Optics for imaging
- Robust classification of bottles from shape
- Algorithmic development
- Material detection
- Bar code reading
- Counting bottles in crates

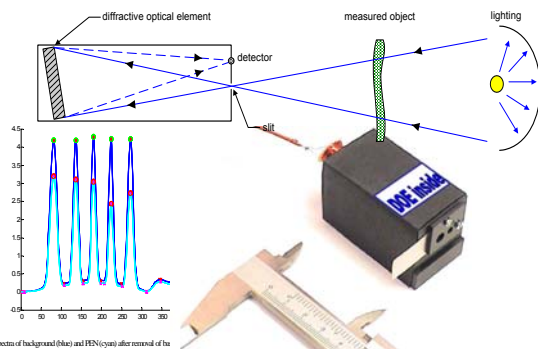
## Waste sorting



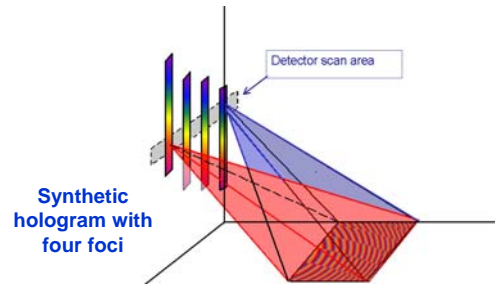
- Automated sorting and separation of beverage cartons, plastics, and paper fractions from waste
- Identifies material from IR-spectra
- One machine sorts 2-6 tons /hour
- > 90% of European market



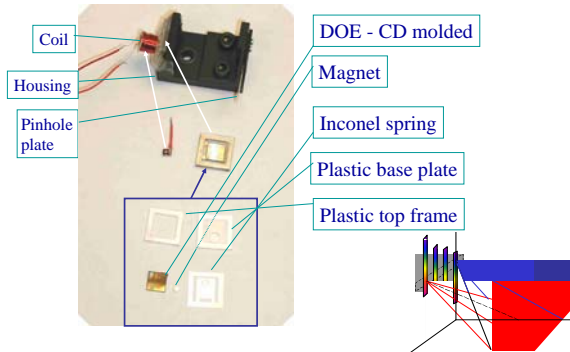
## Low-cost dedicated IR spectrometer



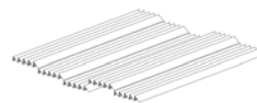
## SINTEF DOE technology for dedicated spectrometers



## Scanning unit

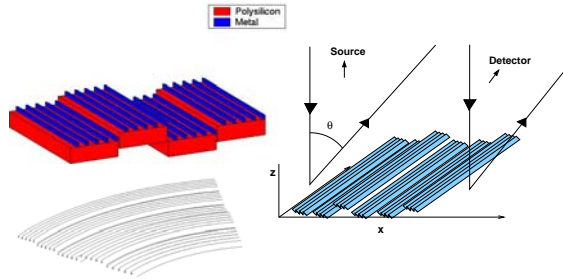


## Spectroscopy with Micromechanically Configurable Diffractive Filter

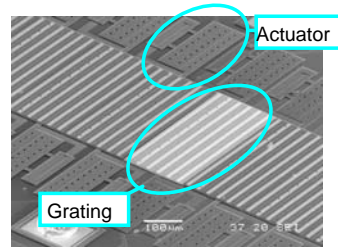


## Programmable grating

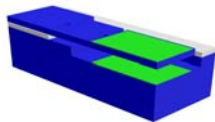
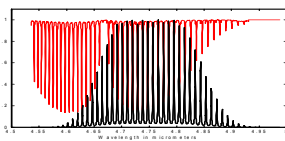
Small grating elements are moved with respect to each other to obtain the desired diffraction effect



## CDOE is made in silicon using Microsystems production technology



## Correlation filter for CO detection



Multi-line interference filter with invisible gap and capacitive actuation to shift between absorption and transmission

## Photo-acoustic gas sensor

- Principle:
  - Target gas sealed in absorption cell
  - Presence of target gas in absorption path reduces pressure signal
- Developed components:
  - Extremely high sensitivity piezoresistive pressure sensor (1 mPa resolution)
  - IR source

