NCSR
National Centre for Sensor Research

Sensor Materials and Technologies for a Better Future

Surface Engineering

Microfluidics — Detection

Signal Amplification — Data Analytics

> *Global challenges in **health, sustainable industry** and the **environment** are solved using sensors based on bioinspired and **biomimetic** materials and systems.*
>
> **Robert Forster** - Director, NCSR

Scientific Strategy

The NCSR team addresses challenges in the field of chemical and bio-sensors through the expertise of a diverse group of investigators across a broad range of disciplines. Our focus is on integrating fundamental insights in (bioinspired)(nano)(4D) materials, detection strategies, and cutting edge fabrication techniques from self-assembly to additive manufacturing with end user insights to create solutions for global challenges. We target measurement science and engineering challenges in food and water safety, industrial processes, security, point-of-use healthcare, the creation and delivery of safe therapeutic agents and biomimetic systems.

NCSR Snapshot

- ➔ 20 interdisciplinary academic research teams.
- ➔ Publish 100-150 peer reviewed publications annually.
- ➔ >95% are in top quartile of journals.
- ➔ 55 Post-Graduate Students.
- ➔ 60 Researchers (PD, RA).
- ➔ ~5 patents granted annually.
- ➔ Annual spend €3.5-5m.

NCSR Projects at a Glance

Wearables and Implantables

We develop ultrathin, flexible sensors and smart tattoos that allow the non-invasive assessment of the skin barrier, or can even be applied to the surface of organs inside the body to continually monitor vital signs or to deliver time-released drugs.

### Bio-inspired Antifouling Coatings

Micro- and nano-textured, super-hydrophobic and dynamic surfaces allow the surface free energy to be controlled so as to prevent (bio)fouling of sensors deployed long term in the environment or in industrial processes.

Ultrasensitive Pathogen Detection

The capture and detection of rare cells is crucial for the diagnosis of diseases from metastatic cancer to sepsis. We create highly efficient capture surfaces to selectively capture targeted cells and highly sensitive methods of detection that allow a few cells per ml of whole blood to be detected.

Sample-to-Answer Microfluidic Devices

Next-generation "Lab-on-a-Chip" platforms are developed for biomedical and environmental applications, automated liquid handling, process analytical techniques and cell line development for biopharma as well as monitoring the environment, infrastructure, industrial processes and agrifood.

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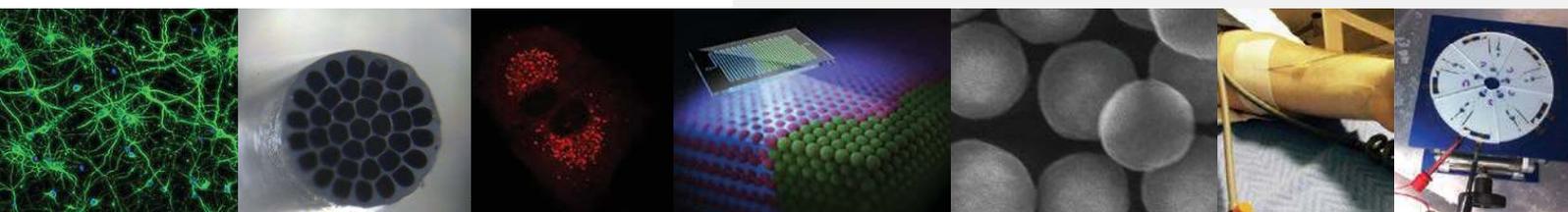
Deep integration of **N**anotechnology, **C**hemo- and bio-materials for **S**ensing in **R**eal world samples.

➡ Targets

Research in house, and through a broad network of collaborators, gives access to novel, validated biomarkers of diseases ranging from neurology to cancer and cardiovascular disease.

➡ Recognition

Deep expertise in antibody, protein and nucleic acid receptors enables sensitive and selective detection of disease biomarkers as well as markers of environmental health and industrial process control.

➡ Detection

High performance electrochemical and optical labels, cutting edge detection strategies and data analysis methods allow targets to be detected with extraordinary selectivity and sensitivity (sub-pM).

➡ Integration

Microfluidic devices allow complex samples such as whole blood, as well as environmental and industrial streams, to be rapidly analysed and results generated.

➡ Validate

State-of-the-art analytical methods allow new high performance sensor systems to be validated against the performance achievable in a centralised testing laboratory.

➡ Information

The data generated by sensors can change our world taking the guesswork out of decision making in society from the doctor's office to the circular bio-economy. We develop new methods to take the huge volumes of data generated, identify new patterns and extract key analytical information.
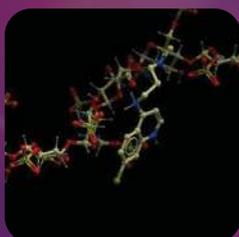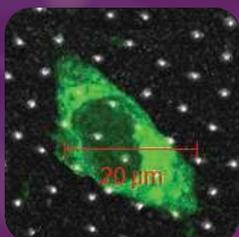
IMPACT

The NCSR is a global player in the development of (bio)chemical sensor systems that tackle key global challenges and deliver economic and social impact. **Join us in our mission.**