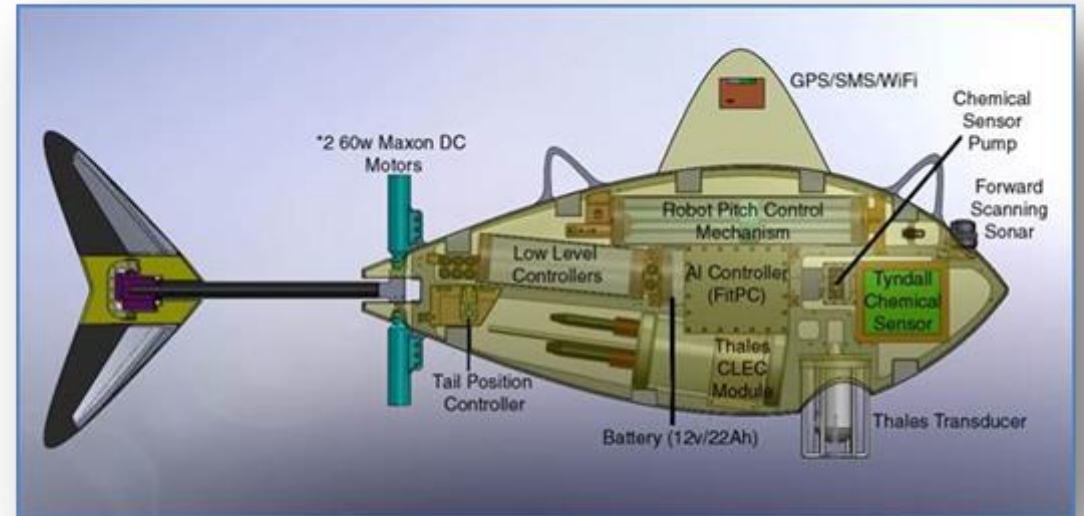# Application of sensors for fish health and welfare in aquaculture
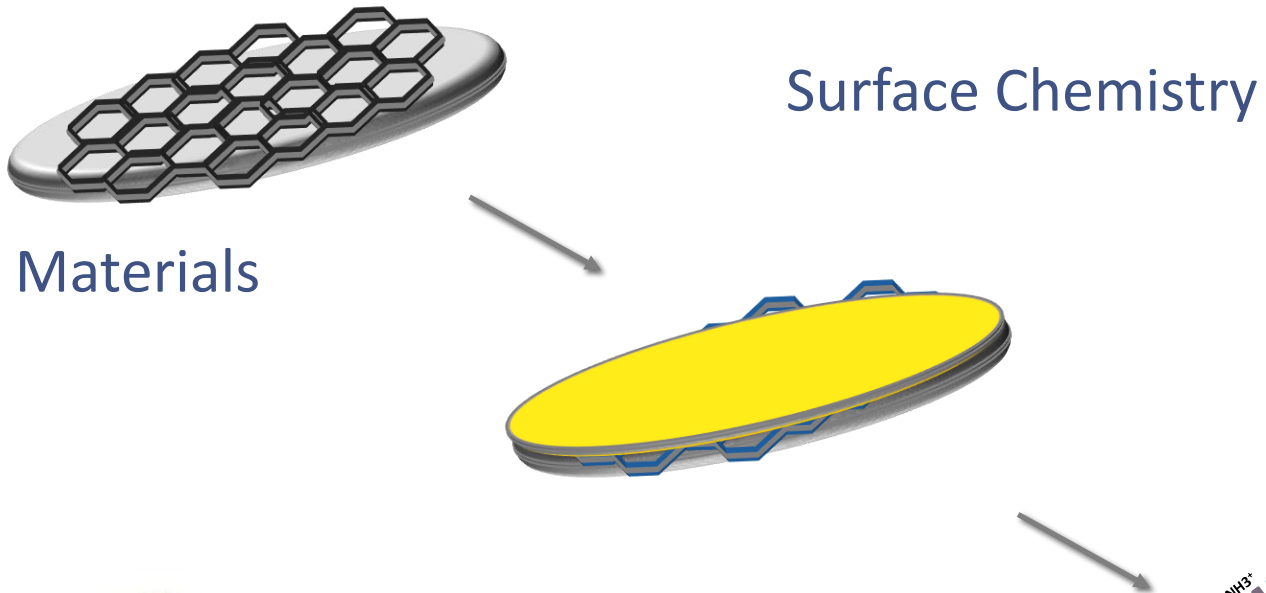
Dr Sofia Teixeira

Tyndall National Institute, Ireland

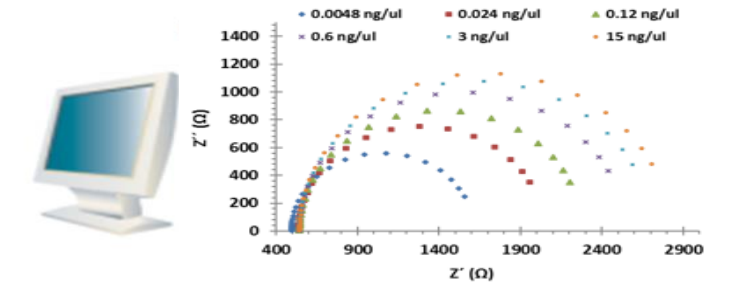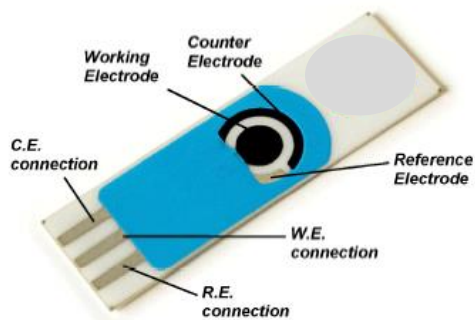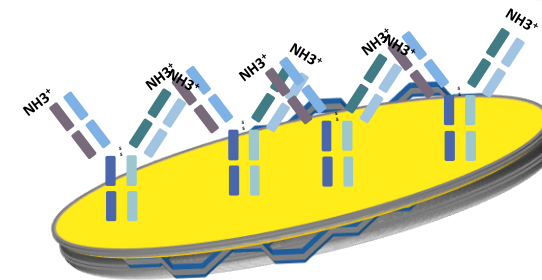**Application of Sensors in Precision Aquaculture**

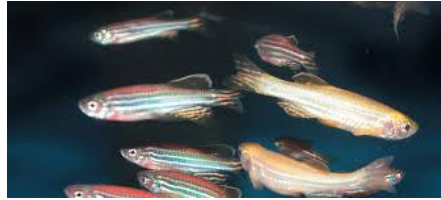**25 May 2021**

Flexible, label free

Materials

Surface Chemistry

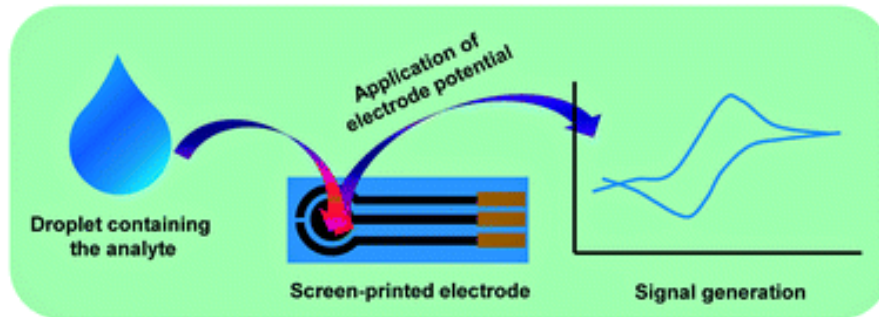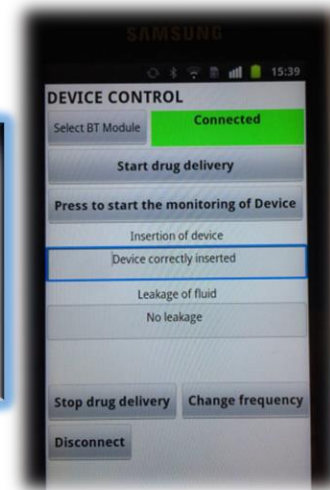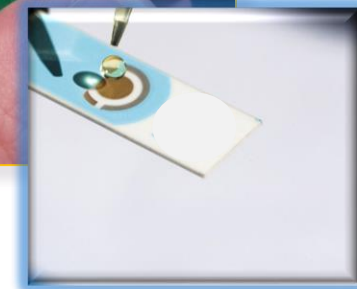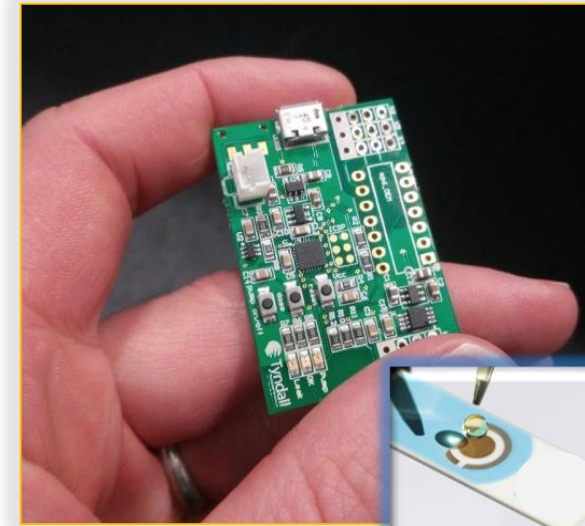Electrochemical output

Bio-receptor

Quantification of Biomarkers

1. Identification of specific biomarkers
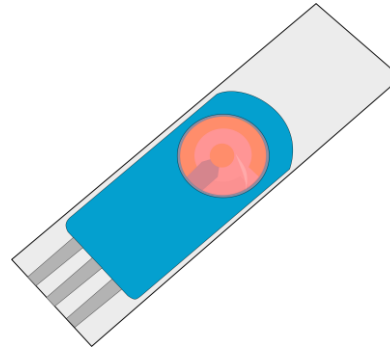
2. Biosensor development for objective biomarker selection

Droplet containing the analyte

Application of electrode potential

Screen-printed electrode

Signal generation

Biomarkers for…

SCREENING
Highly specific, minimize false positive and negative
Easily detected without invasive procedures
Cost effective

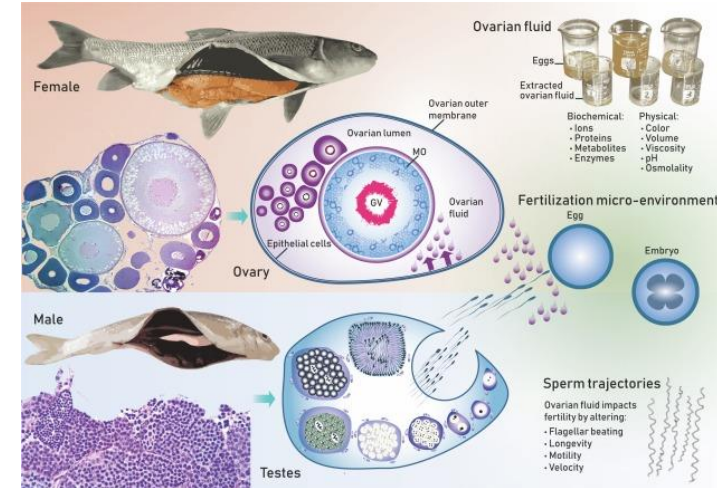| DIAGNOSIS |
| --- |
| Sensitivity, specificity, and accuracy |
| Be prognostic of outcome and treatment |

Biomarkers for…

🔴 Blood

🟡 Urine

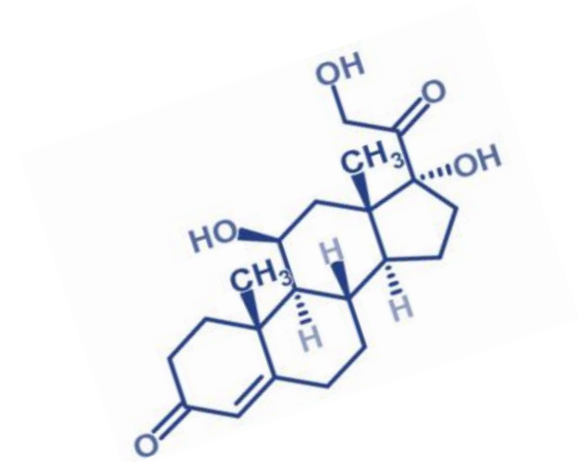🔵 Other body fluids

🟢 Tissue samples

Cortisol

Exposure to causes of stress

Production and secretion of cortisol

from adrenal glands
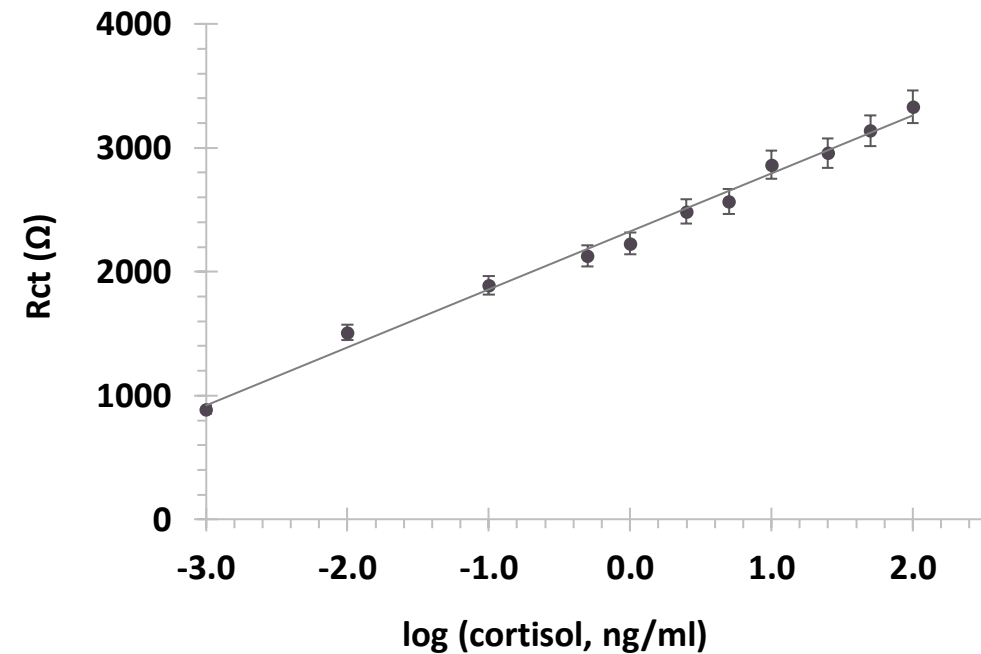
cortisol levels
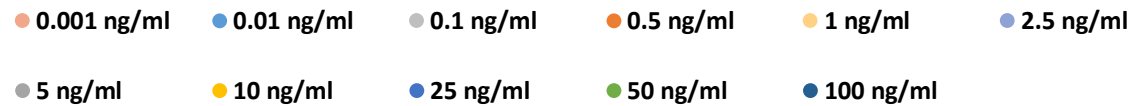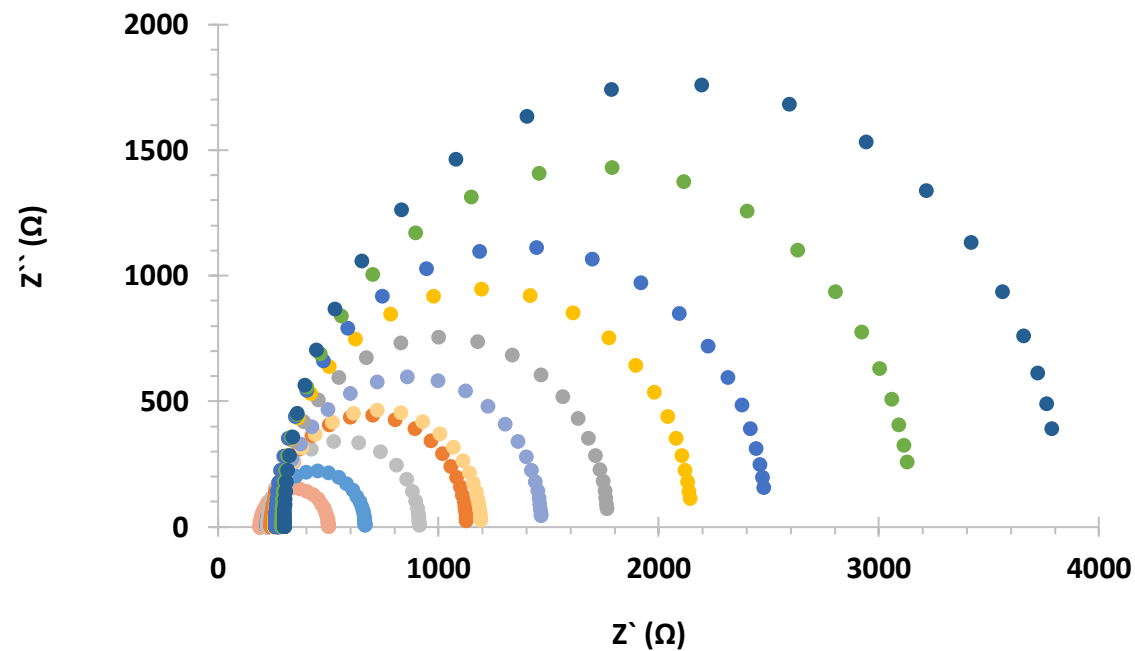
$10^{-7} - 10^{-6}$ M (high)

$10^{-9} - 10^{-8}$ M (low)

Altered cortisol levels
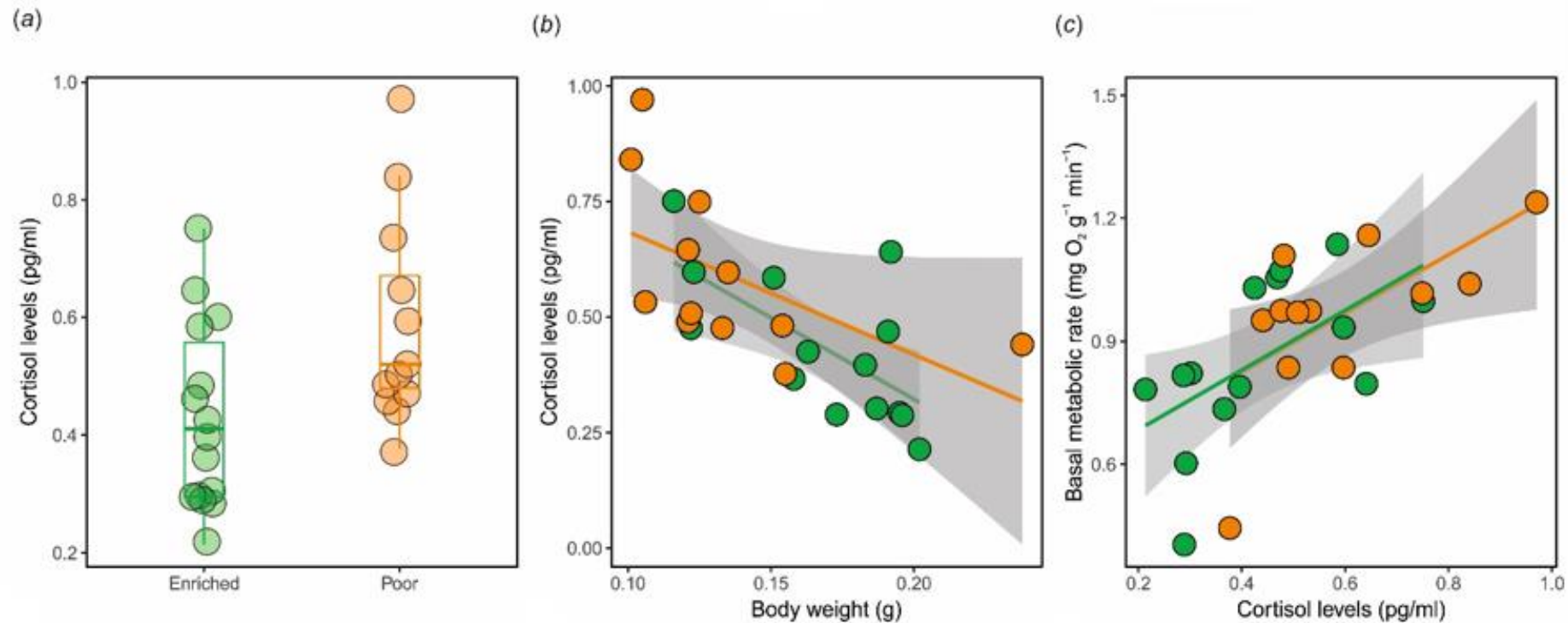
linked to a range of stress-related disorders.

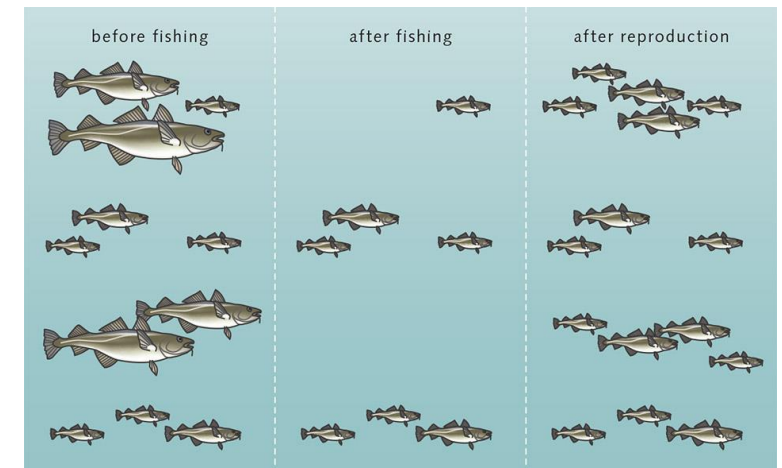# Analytical Response - Detection
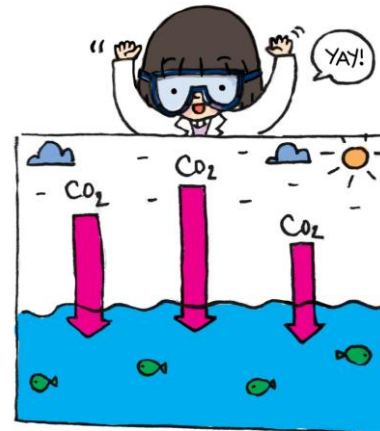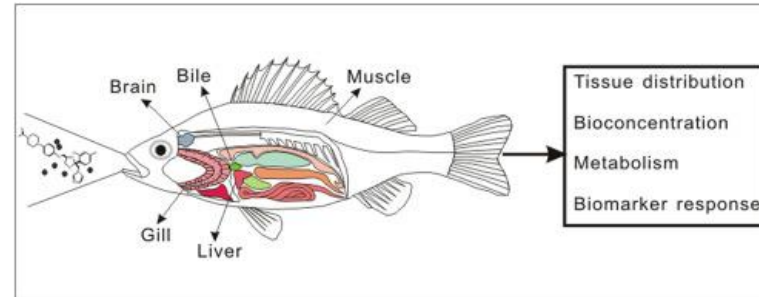

LOD = 0.005 pg/ml = 5fg/ml

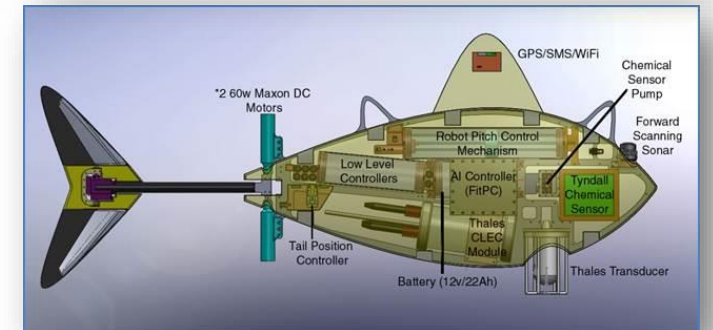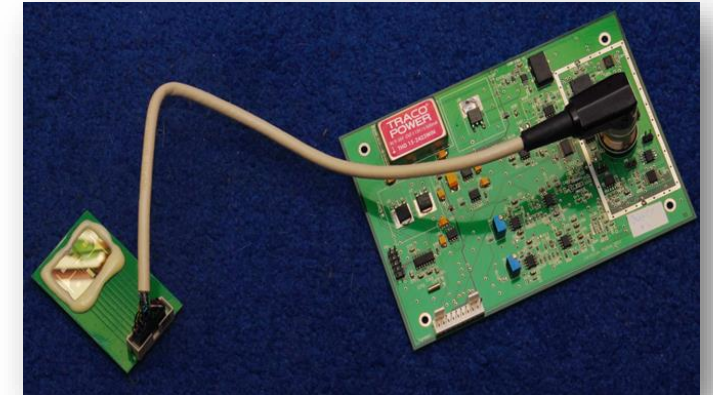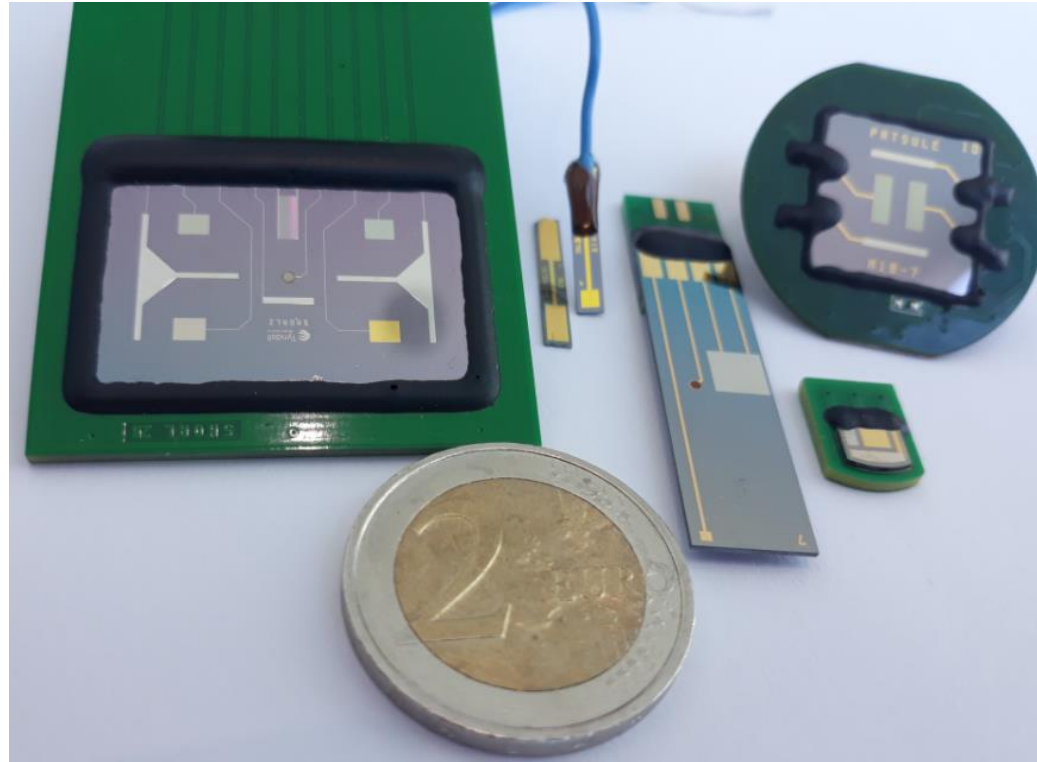# Analytical Response - Physiological and behavioural relationships

Applications on Welfare in Aquaculture

- ☐ Stress
- ☐ Immune Function
- ☐ Metabolism changes
- ☐ Natural Behavior
- ☐ Reproductive capacity
- ☐ Growth Changes

Smart Sensors for Wellness and Health in aquaculture

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Acknowledgments