

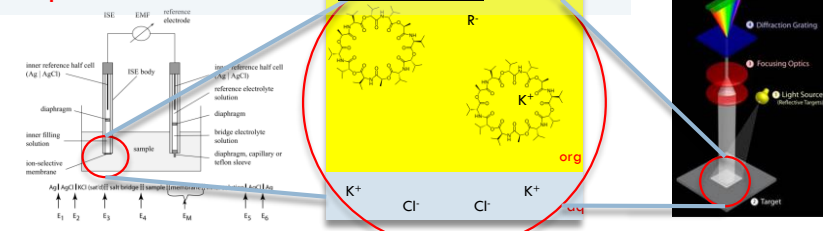
# Ionophore-based sensors in BiFOR; results and opportunities



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## Ionophore-based sensors - Introduction



## ADVANTAGES

- Measure only bioavailable species
- Not affected by sample colour or turbidity
- Wide concentration range
- Simple & inexpensive
- Fast response time
- Can measure both anions and cations at the same time

ICPMS	ISEs
0.32 ± 0.02 µg/L	0.52 ± 0.06 µg/L
0.50 ± 0.04 µg/L	0.66 ± 0.08 µg/L
1.67 ± 0.08 µg/L	1.65 ± 0.09 µg/L
1.98 ± 0.07 µg/L	2.07 ± 0.09 µg/L
4.87 ± 0.11 µg/L	5.20 ± 0.14 µg/L
1.23 ± 0.08 µg/L	1.65 ± 0.09 µg/L
0.90 ± 0.03 µg/L	1.04 ± 0.05 µg/L
2.14 ± 0.07 µg/L	2.61 ± 0.09 µg/L
9.68 ± 0.25 µg/L	10.00 ± 0.10 µg/L
2.90 ± 0.11 µg/L	2.61 ± 0.30 µg/L
5.52 ± 0.18 µg/L	6.55 ± 0.05 µg/L
172.35 ± 12.15 µg/L	207.20 ± 0.14 µg/L

Salzha Anastasova, Aleksandar Radu, Gheza Mateu, Claudia Zulfari, Ulrika Mattinen, Johan Bobacka, Dermot Diamond; Disposable solid-contact ion-selective electrodes for environmental monitoring of lead with ppb limit-of-detection; *Electrochimica Acta*, 2012, 73, 93-97

## Ion-Selective Electrodes (ISEs)

## optodes

## ISEs – Trends: simplification

NH<sub>4</sub><sup>+</sup> - ISE NO<sub>3</sub><sup>-</sup> - ISE

Reference electrode

Fayose, T., Mendecki, L., Ullah, S., Radu, A.; Single strip solid contact ion selective electrodes on simple platform prepared using household items; *Analytical Methods*, 2017, DOI: 10.1039/C6AY02860H

## integration with wireless communication devices

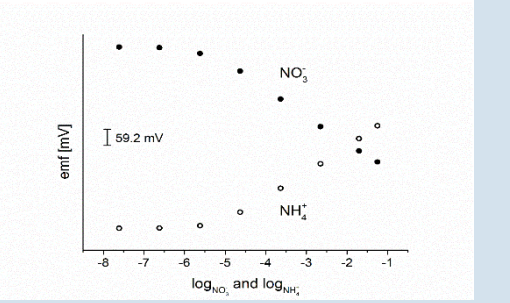
Comrac Fay, Conor Slater, Sandra Teodora Buda, Dimitrije Cimil, Salzha Anastasova, Aleksandar Radu, Dermot Diamond; Development of a simple sensor node as a part of wireless sensor network for in-situ environmental analysis; *IEEE Sensors*, 2011, 99, 1

## robustness – precision

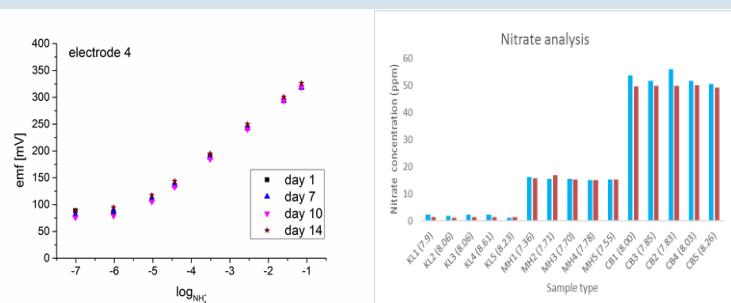
Peter Dillingham, Tarja Roda, Dermot Diamond, Aleksandar Radu\*, Christina McGraw; Bayesian Methods for Ion Selective Electrodes; *Electroanalysis*, 2012, 24(2), 316-324

Fig. 5. (a) - (c) In each cell sample as indicated from the individual ISE responses (a-c) and the combined responses (d) when standard addition is used. Error bars indicate 95% confidence intervals; red line curves indicate prior calibration; 95% measurements (a-c) and 75% (a-d) are also presented for comparison.

## ISEs – in BiFOR NO<sub>3</sub><sup>-</sup> and NH<sub>4</sub><sup>+</sup> in the same time



## long-term stability and real-life samples



## NH<sub>4</sub><sup>+</sup> and NO<sub>3</sub><sup>-</sup> in BiFOR's soil samples

