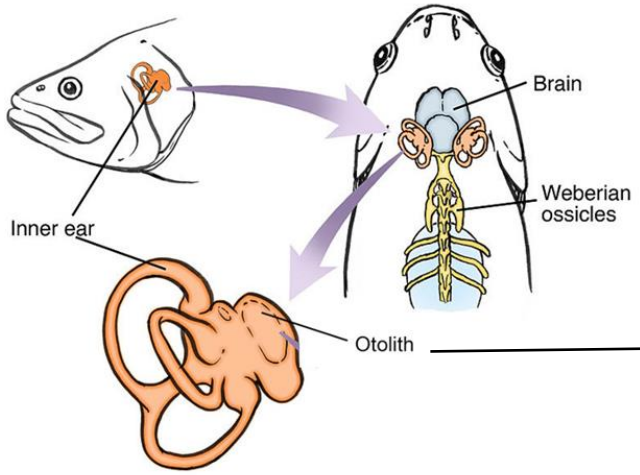
LA-ICP-MS: $CaCO_3$ matrices

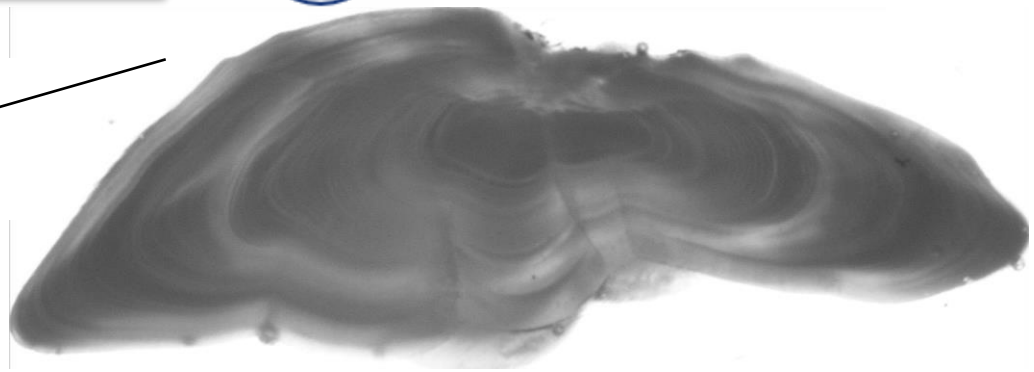
Environmental science

GHENT UNIVERSITY

"Sclerochronological" toxic metal analysis in otoliths by LA-ICP-MS

INSTITUTE OF MARINE RESEARCH





** Transversal cut of an otolith from Cod (Bergen, Norway)*

- ❑ Otoliths are bones located in the inner ears of fish
  - ✓ **Growth Rings:** Otoliths exhibit distinct growth rings or bands similar to tree rings→ Each ring corresponds to a period of time.
  - ✓ **The metal composition of the otolith's layers gives key** information about anthropogenic activities (i.e., pollution) in the environment.

- ❑ How to obtain reliable information from otoliths by LA-ICP-MS measurements?
  - ✓ Spot/bulk analysis
  - ✓ Profile analysis (lines)

  - ✓ **Elemental mapping**

**Work presented by Ana Lores-Padin, PhD*

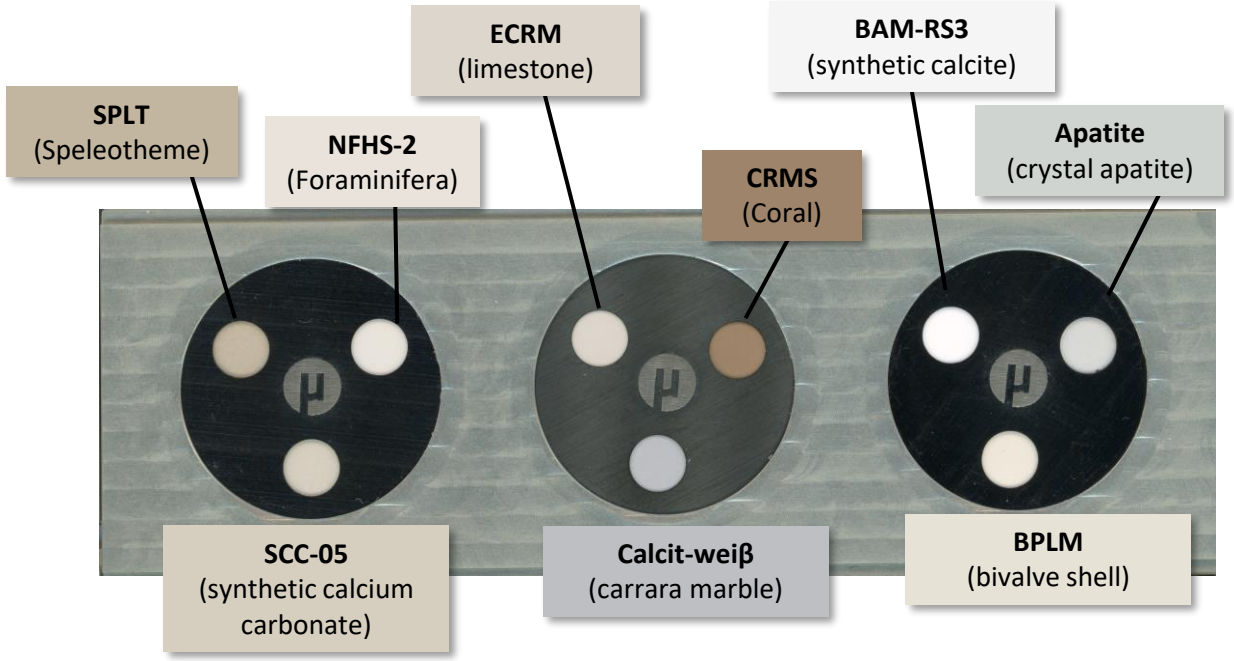
LA-ICP-MS: $CaCO_3$ matrices

Environmental science

μ standards precision.accuracy.trust.

Matrix-matched reference materials

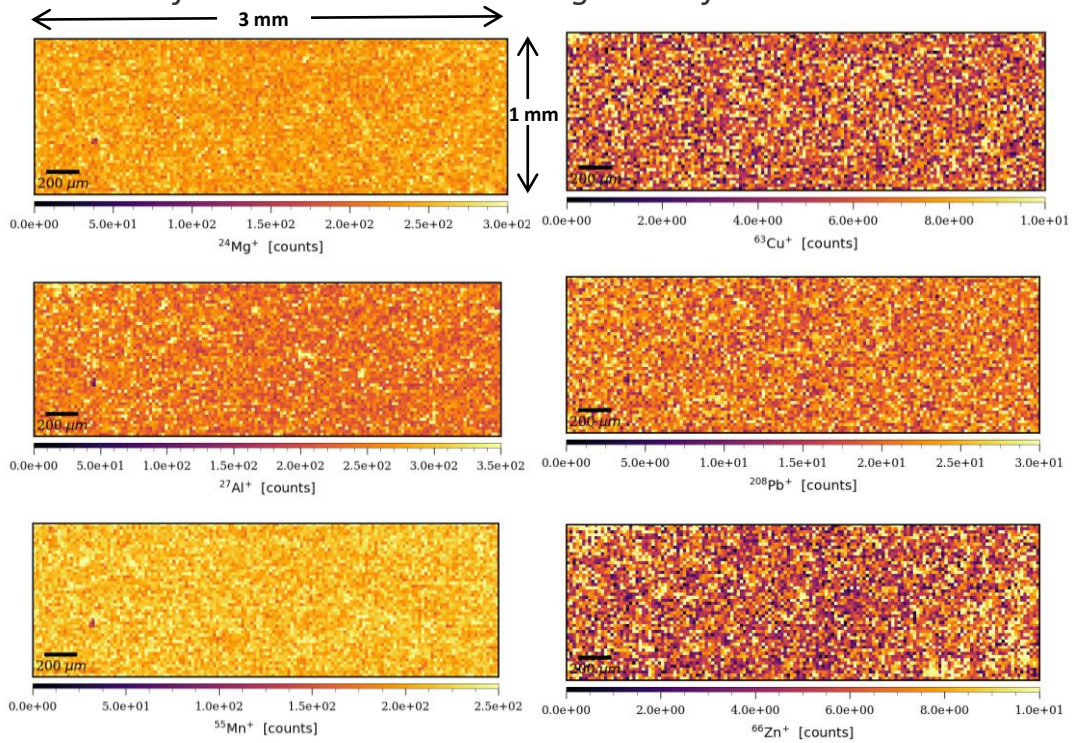
$CaCO_3$ matrix



Elemental homogeneity tests using larger laser spot size: 80 µm microanalysis? mapping?

i.e., mapping of NFHS-2-Nano Pellet

Foraminifera →calcareous micro-organisms from the ocean.



Iridia 193 nm (ArF* Teledyne Photomachines) + cobalt + ARIS	Value
He Flow (L min^{-1})	0.5 + 0.5
Laser diameter, spot (µm)	20 x 20
Fluence (J $cm^{2\ -1}$)	4
Frequency (Hz)	50
Dosage	1

icpTOF-MS-2R (Tofwerk)	
ODG	36-40 ms

GHENT UNIVERSITY

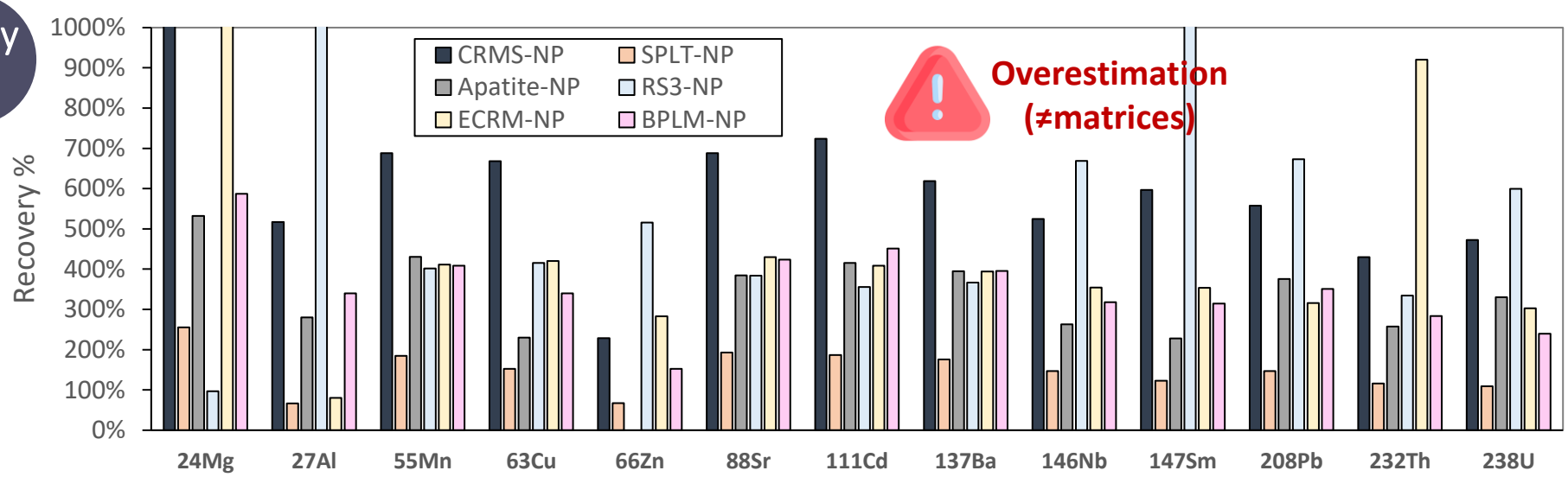
**Work presented by Ana Lores-Padin, PhD*

LA-ICP-MS: $CaCO_3$ matrices

Environmental science

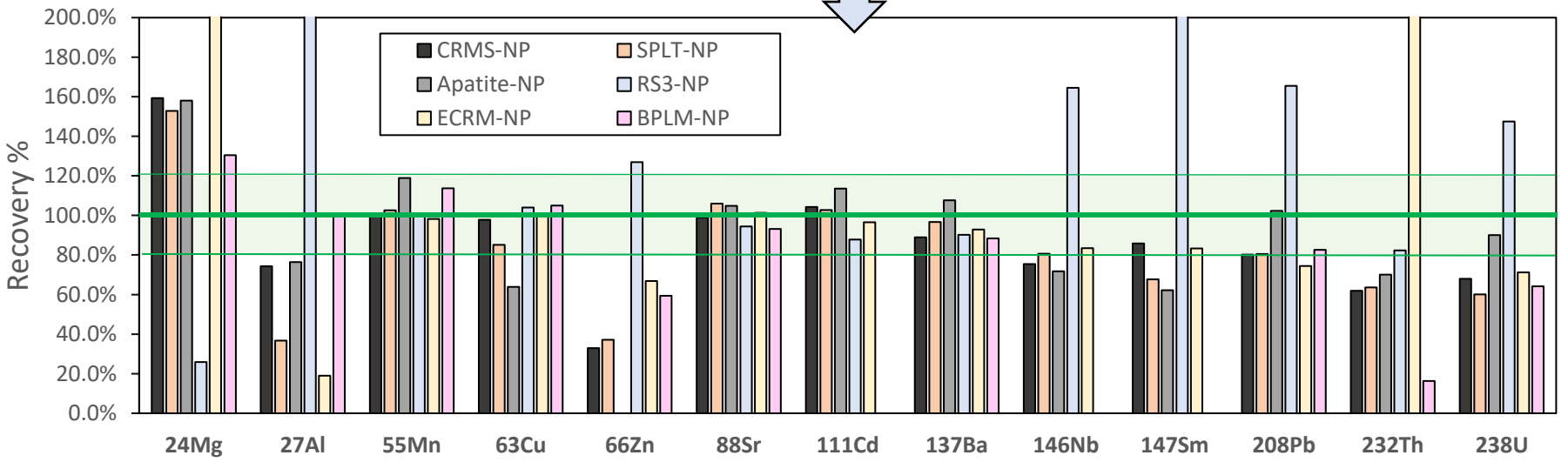
Testing the nano-pellets homogeneity for mapping quantification

- **Different areas were evaluated (20 um spot size)→** from 3 mm^2 (50 scan lines), 10, 5 and 3 lines
- **Cross-quantification:** Quantified against NIST SRM 600 series (n=3 replicates, RSD<15% for all elements shown).
- **Evaluation of correction by internal standard ^{44}Ca**
- **Against other nano-pellets:**
  - ✓ using all of them as an external calibration: calibration curve
  - ✓ using just one nano-pellet (intermediate concentrations)



Overestimation (≠matrices)

^{44}Ca IS correction



GHENT UNIVERSITY

μ standards precision.accuracy.trust.

**Work presented by Ana Lores-Padin, PhD*

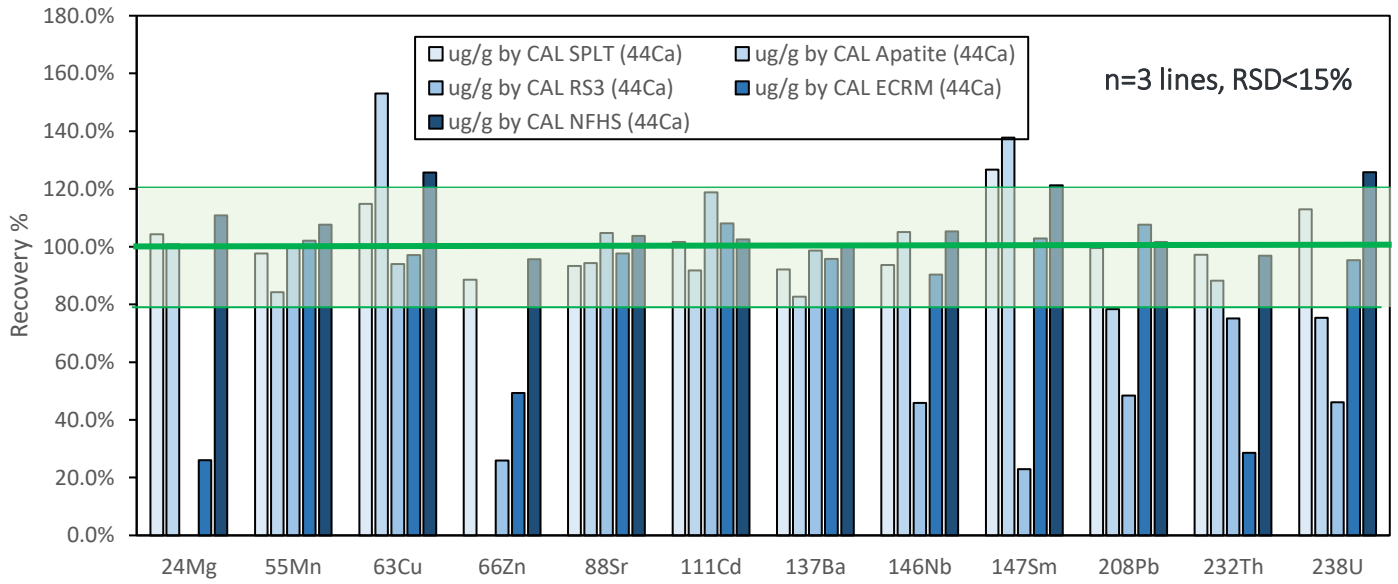
LA-ICP-MS: $CaCO_3$ matrices

Environmental science

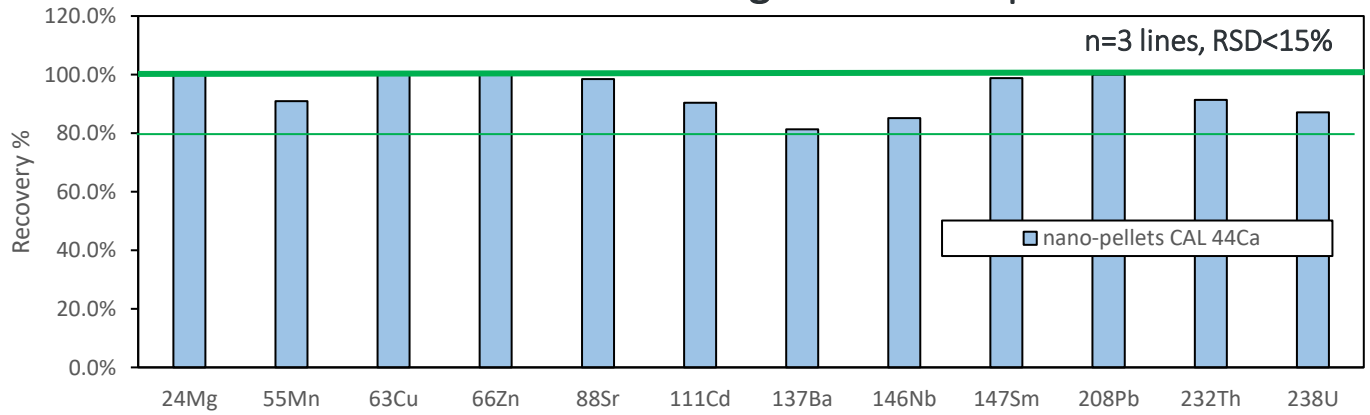
i.e., CRMS-NP

Skeletal fragments of Corallium from Mediterranean Sea

❑ CRMS-NP characterization using just ONE nano-pellet



❑ CRMS-NP characterization using set of nano-pellet: calibration curve



GHENT UNIVERSITY

μ standards precision.accuracy.trust.

**Work presented by Ana Lores-Padin, PhD*