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# Characterization of the Frames Cell and its Application to Mapping

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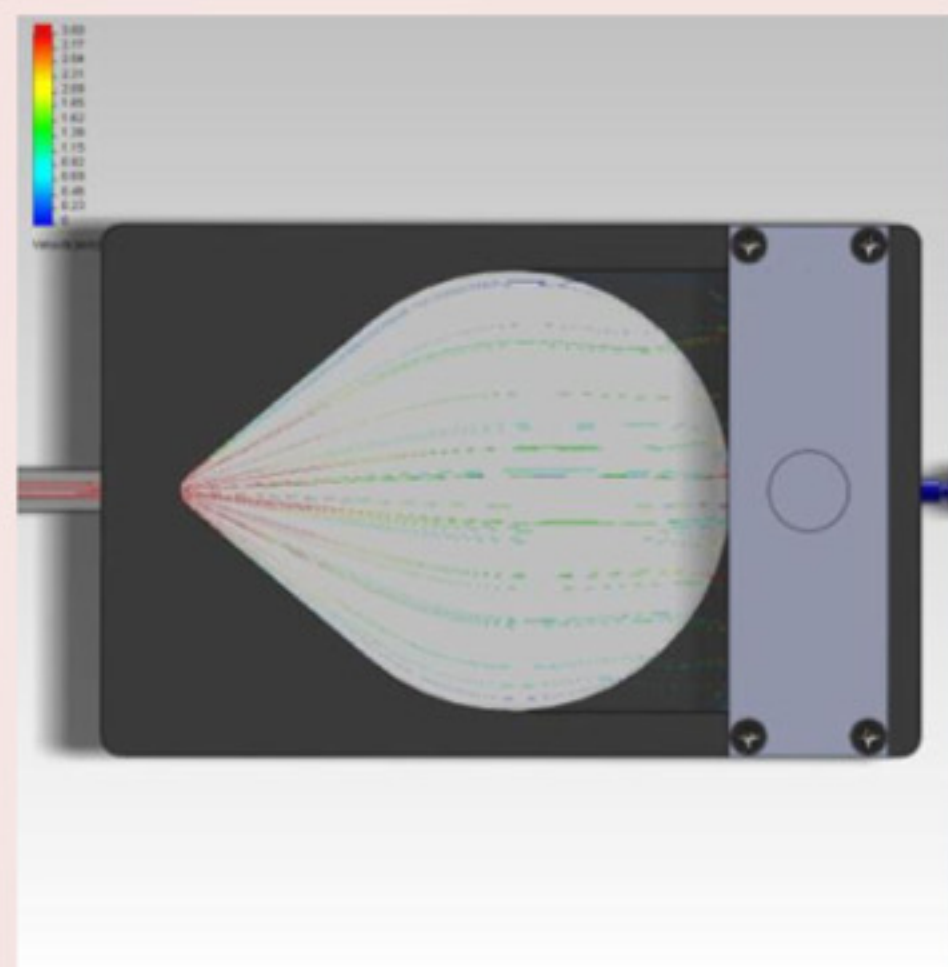
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## Geometry

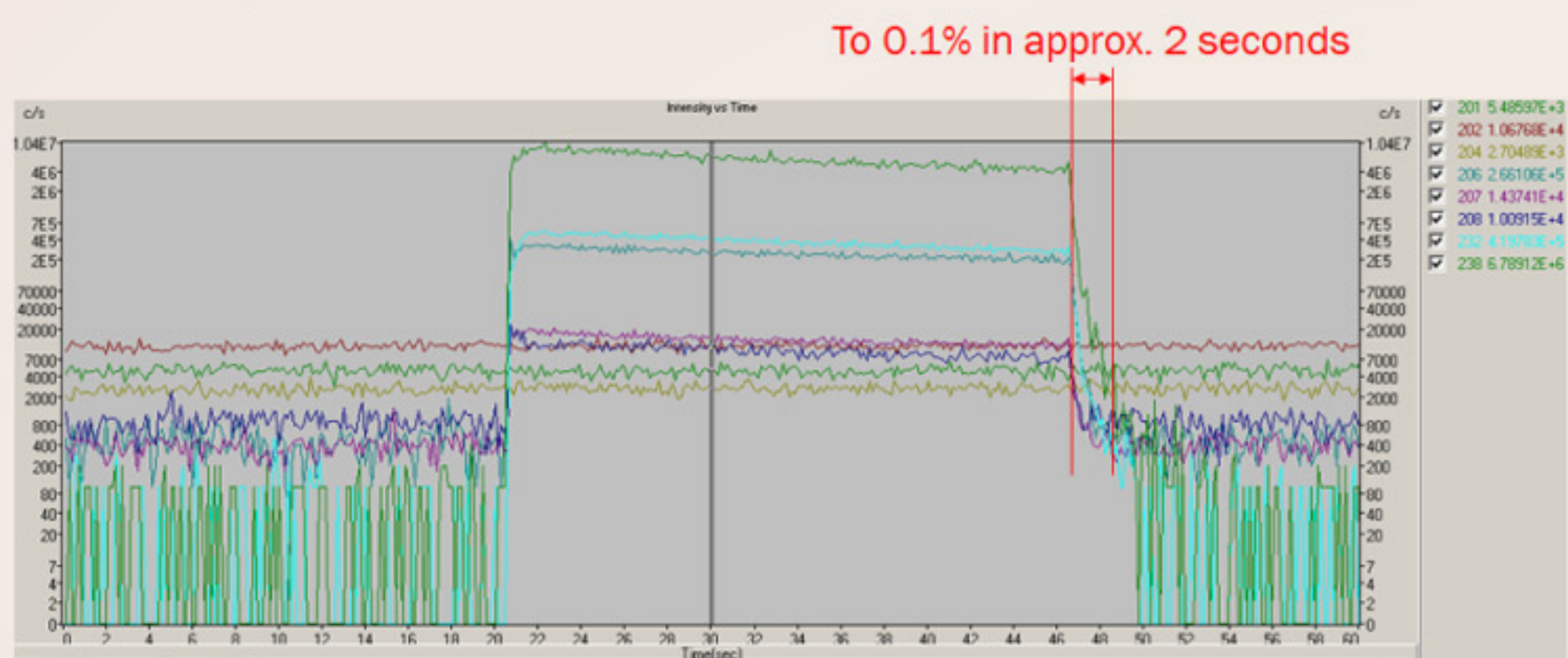
The Frames Cell is a single volume cell that utilizes teardrop geometry to provide laminar flow and fast washout across the available sampling surface.



The cell comprises a multiple piece design, where sample inserts to house particular samples are used to eliminate dead-spots in the cell. A proprietary Fluidizing Plate ensures even flow across the remaining volume. The final cell has a 75 mm diameter working area that accepts samples up to 25 mm in height.

## Washout

Washout was tested\* using various whole zircons using an Analyte G2 Ar-F excimer laser ablation system (Photon Machines Inc., Redmond, WA) coupled to a Varian 820 ICP-MS (Varian Inc., Palo Alto, CA).



\*Customer data.

Using a sweep flow of 0.6 l min<sup>-1</sup> He and a make-up flow of 1.1 l min<sup>-1</sup> Ar, washout across the cell was consistently found to be < 4 secs to baseline.

## Mapping

The fast, uniform washout means it is particularly suited to mapping. To demonstrate this, the cell was fitted to a CETAC Technologies LSX-213 G2 Nd:YAG laser ablation system (CETAC Technologies, Omaha, NE) coupled to an Agilent 7700x ICP-MS (Agilent Technologies Inc., Santa Clara, CA).



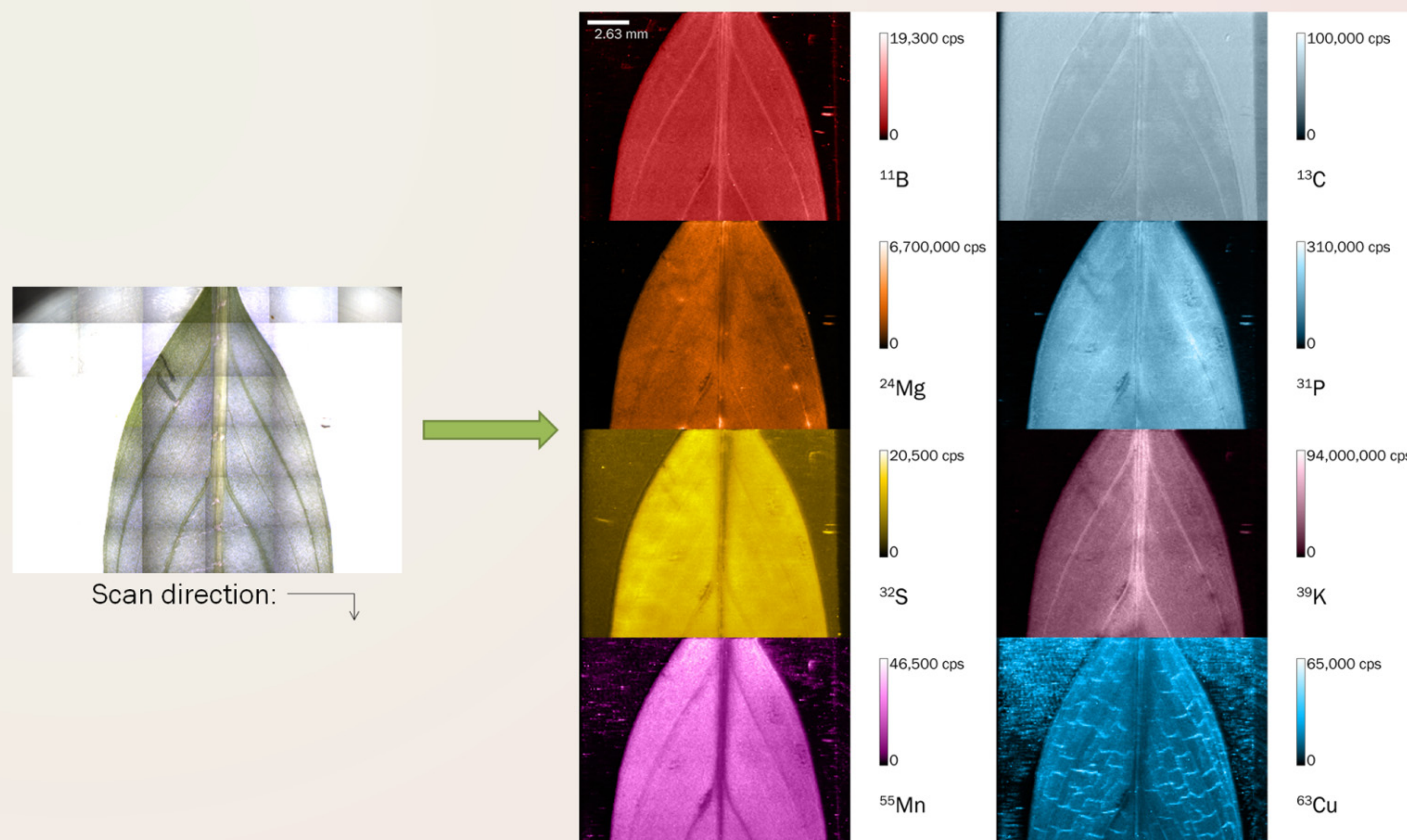
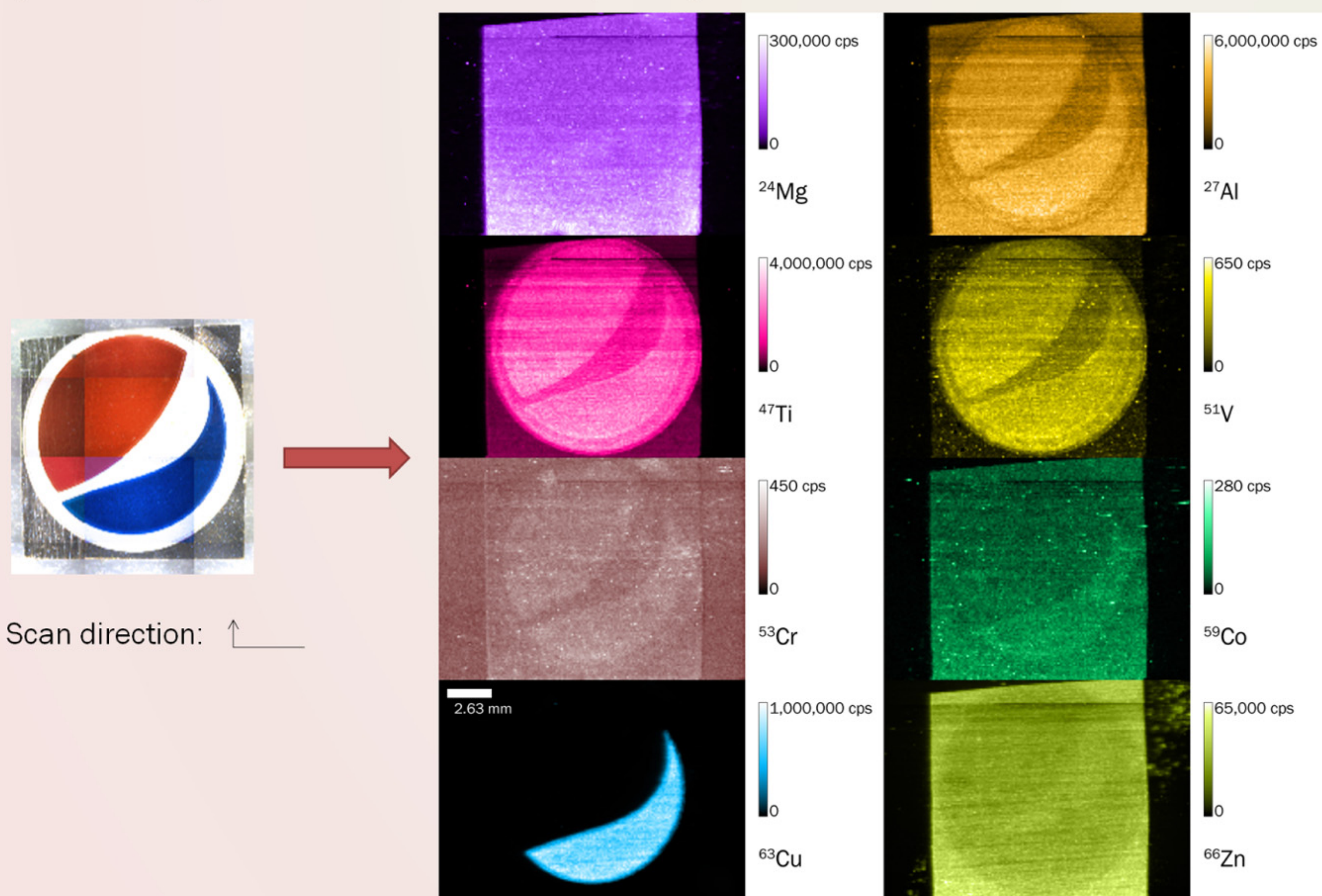
## Conditions

A sample of soft drink label, which incidentally contained the Pepsi® logo (PepsiCo Inc.), was mapped at the center of the cell, and a juvenile leaf from a peace lily (*spathiphyllum wallisii*) at the edge of the available sampling area..

| Agilent 7700x                 |   |
|-------------------------------|---|
| Forward Power                 | 1100 W  |
| Nebulizer (carrier) gas       | Leaf - 0.34 l min <sup>-1</sup><br>Label - 0.94 l min <sup>-1</sup> |
| Sampling Depth                | 3 mm  |
| Dwell Time                    | 100 ms per nuclide<br>C13 - 50 ms on leaf map                       |
| CETAC Technologies LSX-213 G2 |   |
| Spot Size                     | 100 µm  |
| Energy                        | 40 %  |
| Line Spacing                  | 10 µm   |
| Scan Rate                     | Leaf - 137 µm sec <sup>-1</sup><br>Label - 130 µm sec <sup>-1</sup> |
| Helium Flow                   | 700 ml min <sup>-1</sup>  |

## Results

CPS maps for a variety of trace metals in each sample are presented below.



## Conclusions

The washout of the Frames Cell to 0.1% is, on average, within 2 seconds and background levels can be achieved in <4 seconds at any point across the relatively large sampling area. The combination of the fluidizing plate and teardrop geometry allows spatial resolution to be maintained when gathering multi-element trace maps.