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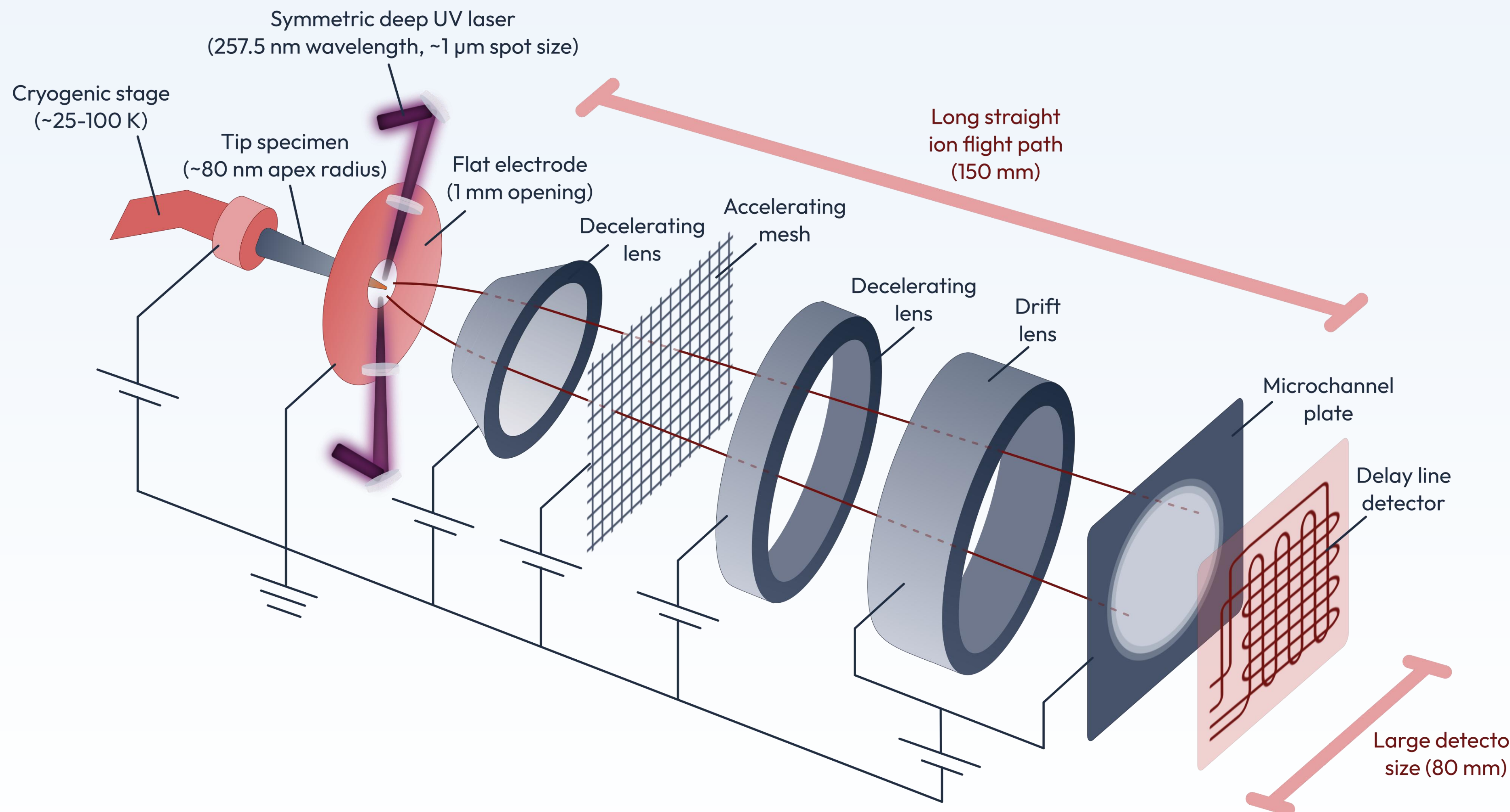
Invizo 6000 Atom Probe Tomography: Operating principles and data analysis

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Ultrawide Field of View Atom Probe: Invizo 6000



Schematic illustration of the CAMECA Invizo 6000 APT

Atom probe tomography (APT) enables near-atomic level resolution (~ 0.4 nm lateral & ~ 0.2 nm depth) of 3D compositional mapping with high chemical sensitivity (< 5 appm) by field evaporation & time-of-flight mass spectrometry.

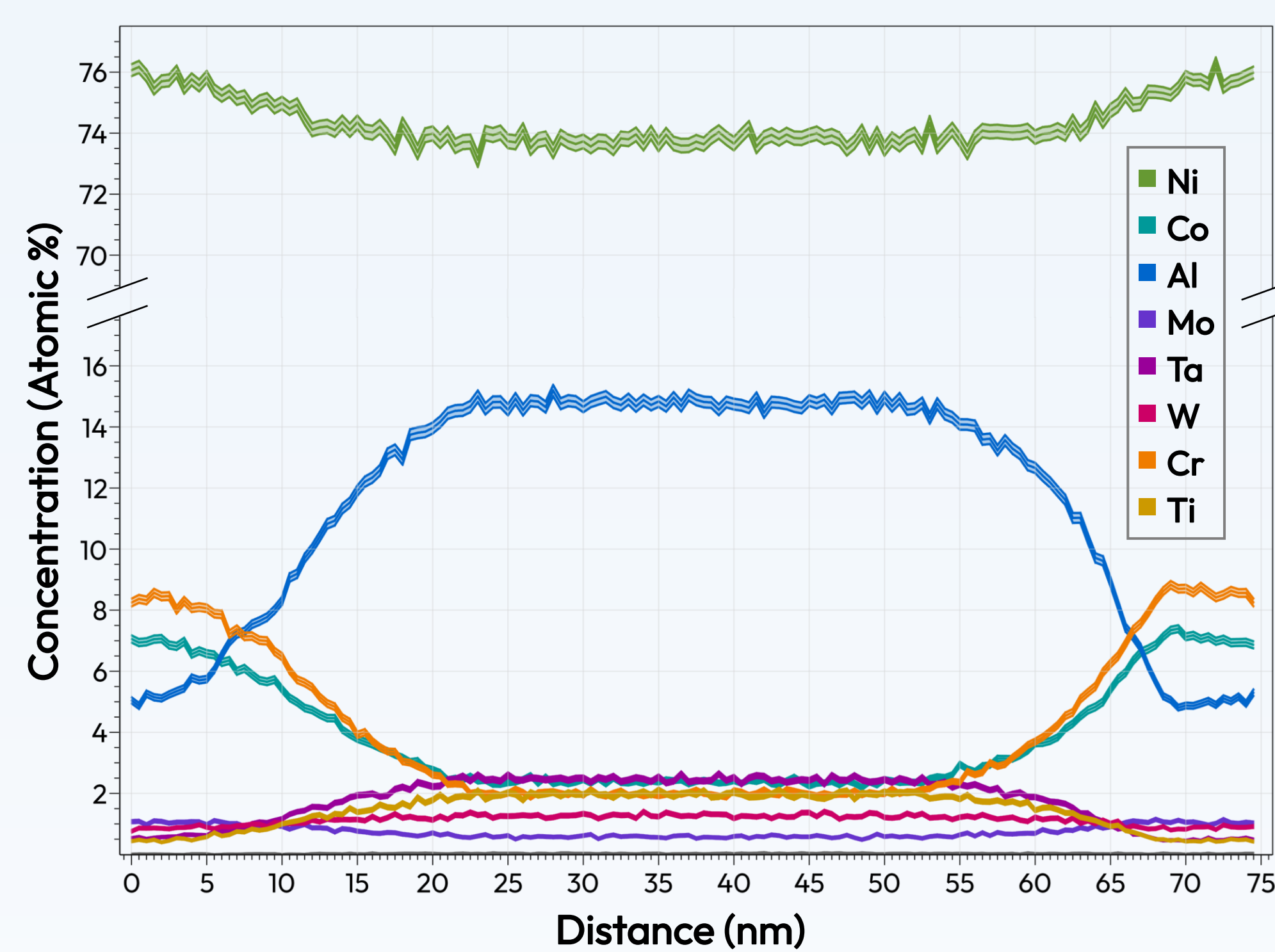
The latest generation Invizo 6000 features:

- **Ultra-wide field of view** (> 200 nm) & collection angle ($\sim 120^\circ$).
- **Straight flight path & double Einzel lensing** for high mass resolving power (MRP).
- **Symmetric dual-beam deep UV laser** for high yield and large analysis volume.
- **High detection efficiency** up to $\sim 62\%$ of all the ions leaving the tip.
- **Live volume reconstruction** to identify ROI & **fully automated** data & specimen management.

3D-printed Ni-based superalloys: An Invizo 6000 case study

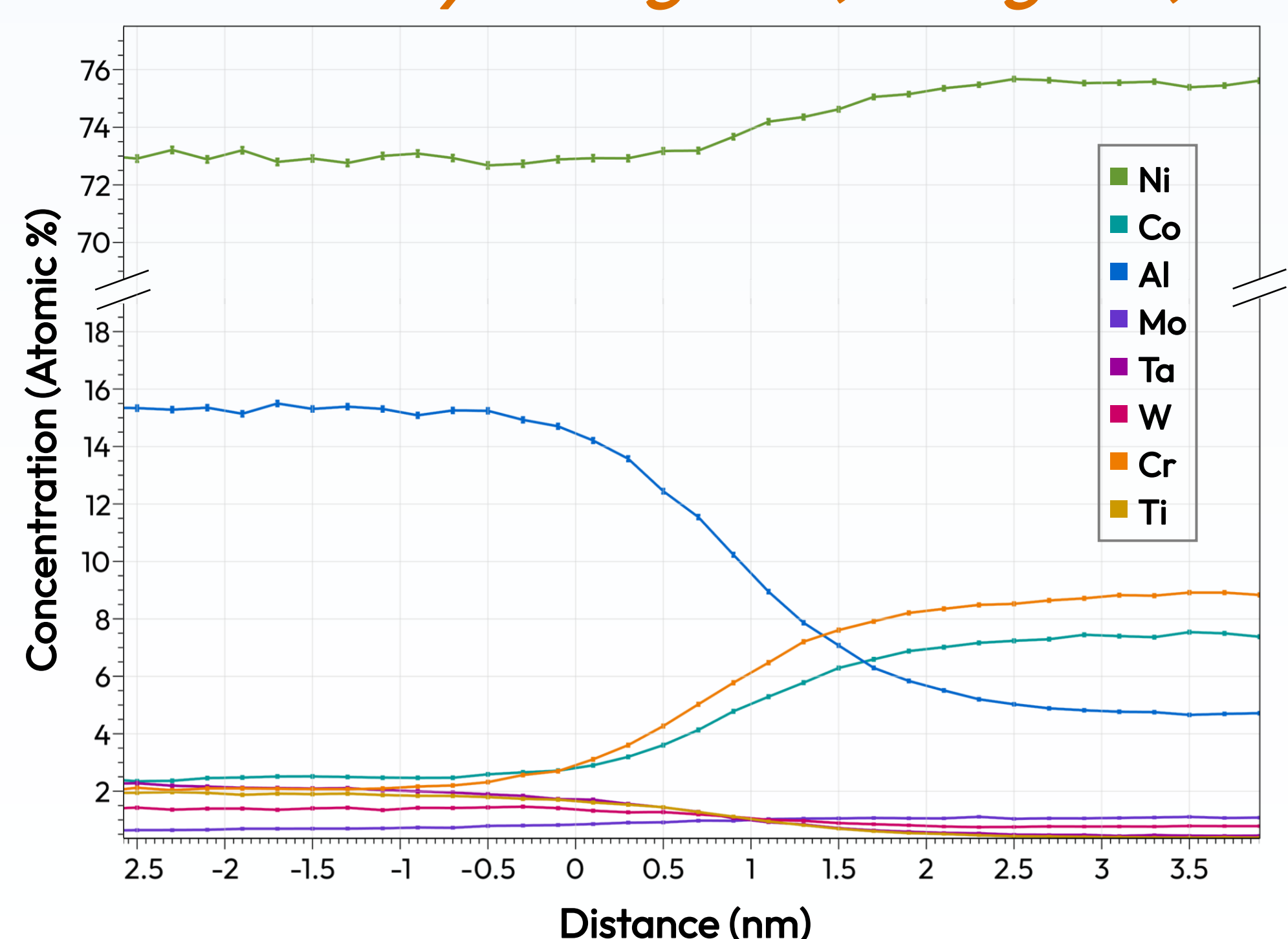
Ni-based superalloys fabricated via additive manufacturing with different compositions and heat treatment conditions contain varied volume fractions and sizes of γ' precipitates. APSuite 6.3 data visualization tool allows for their quantitative analysis.

1D Concentration Profile



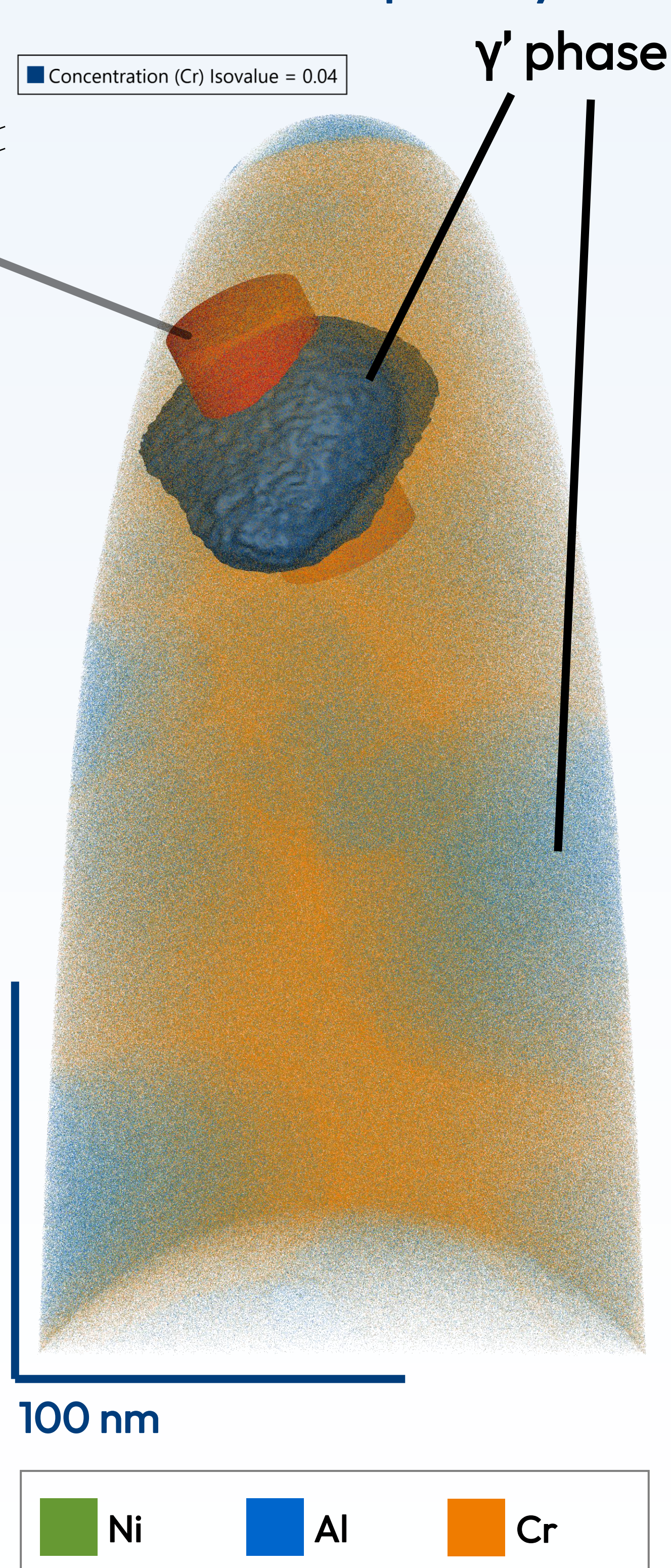
1D concentration profile across a γ' precipitate obtained along a cylindrical ROI highlights the elemental distribution across the matrix-precipitate interface.

Proximity Histogram (Proxigram)

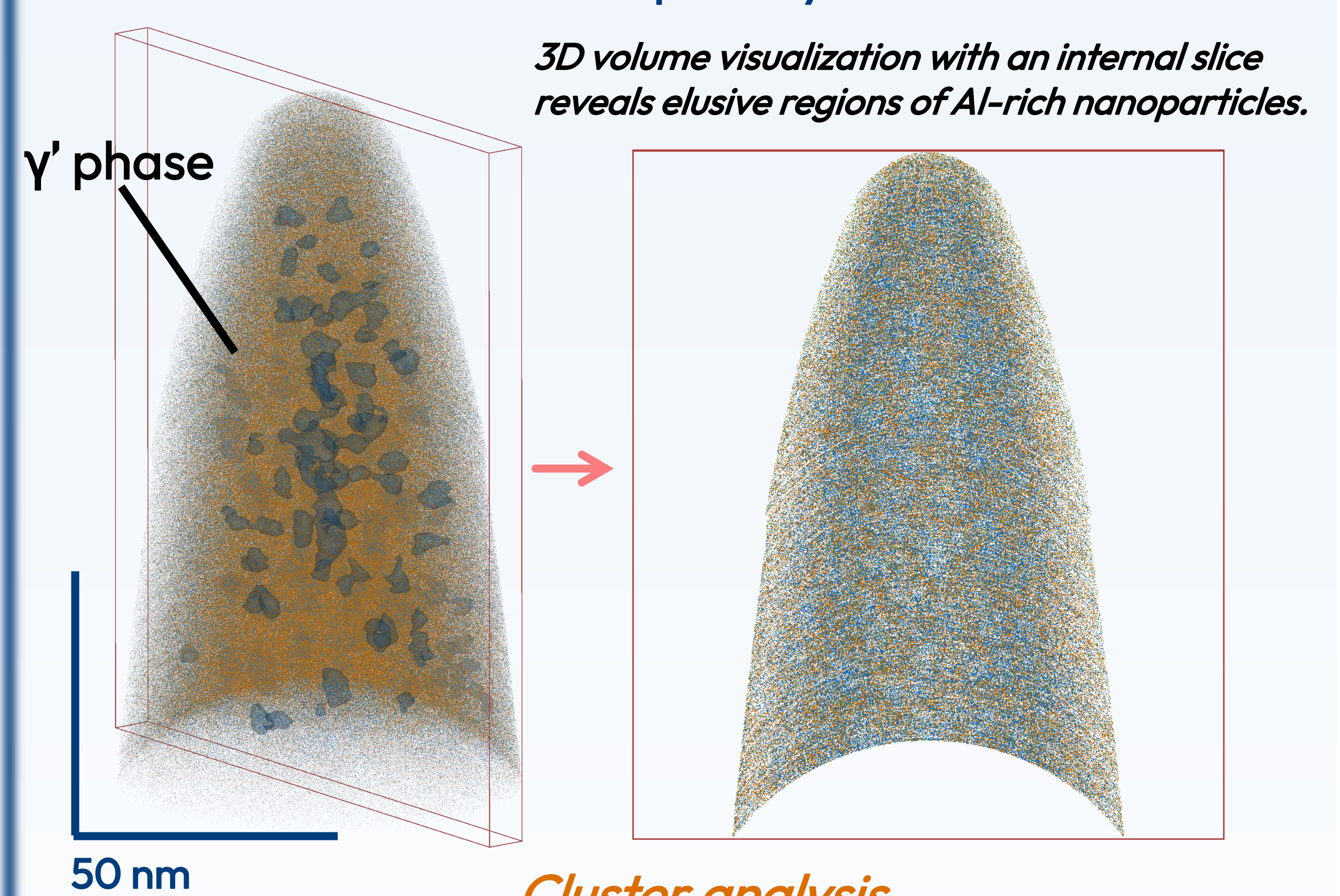


Proxigram showing average concentration profiles of selected γ' precipitates, illustrating compositional variations normal to the precipitate-matrix interface.

Heat treated Ni-based superalloy



As printed, diluted Ni-based superalloy



3D volume visualization with an internal slice reveals elusive regions of Al-rich nanoparticles.

Cluster analysis

~ 80 clusters found with the following statistics:

Volume	15 nm ³	Radius	(1.5, 1.4, 1.5) nm	Size	5000 ions
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Concentration profile from center of identified clusters radially outwards, normalized by the radius of gyration.

