



# **SPECTRAL**

## INDUSTRIES

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Ad Maas, PhD  
Marijn Sandtke, PhD



# Planet Earth and resources



Obtaining



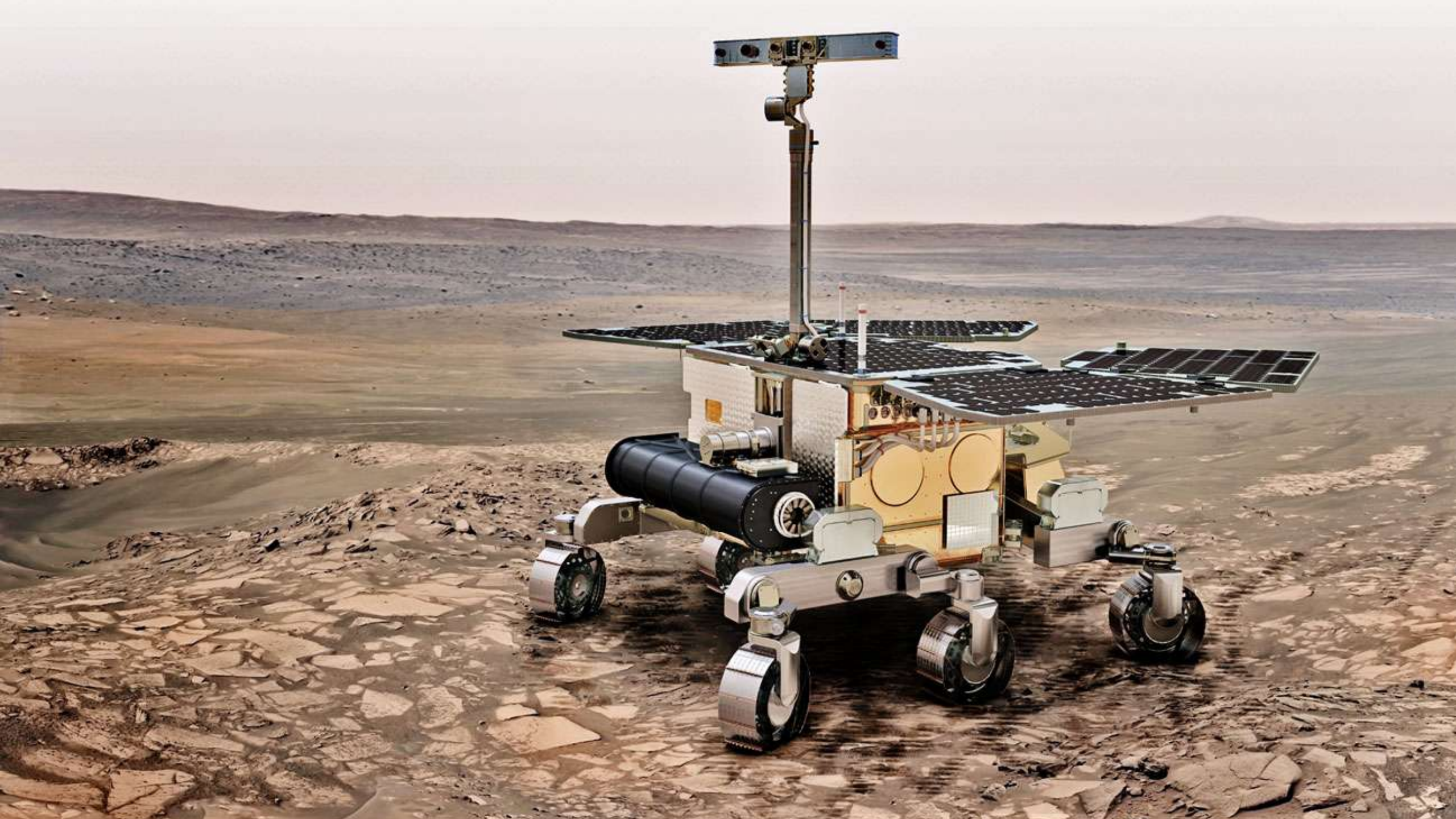
Using



Re-using



**A clear need for sensors in obtaining, using and re-using resources**

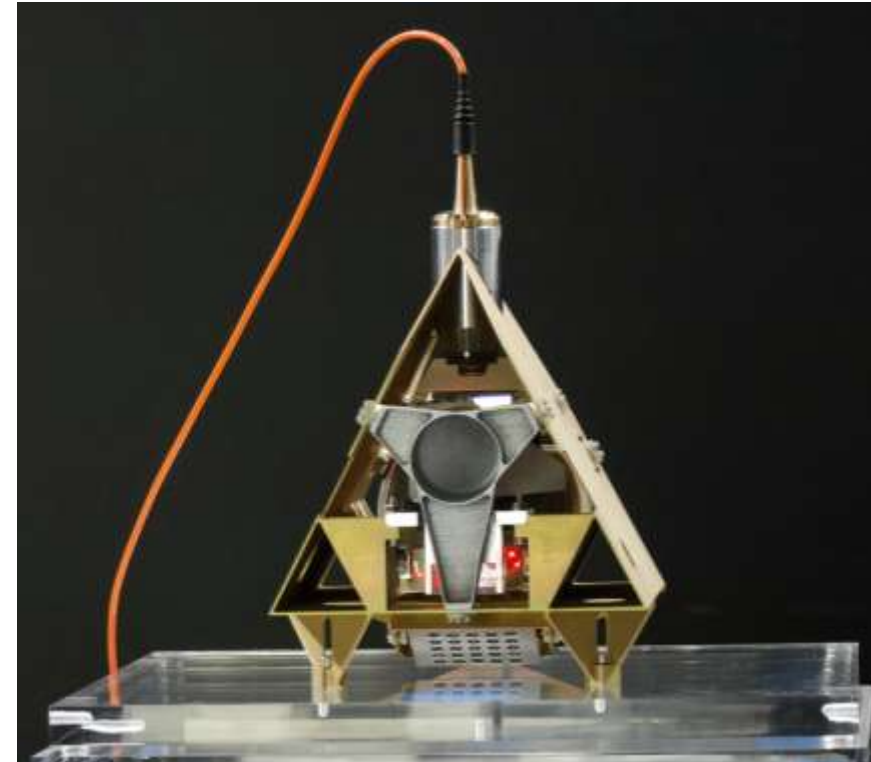


# History

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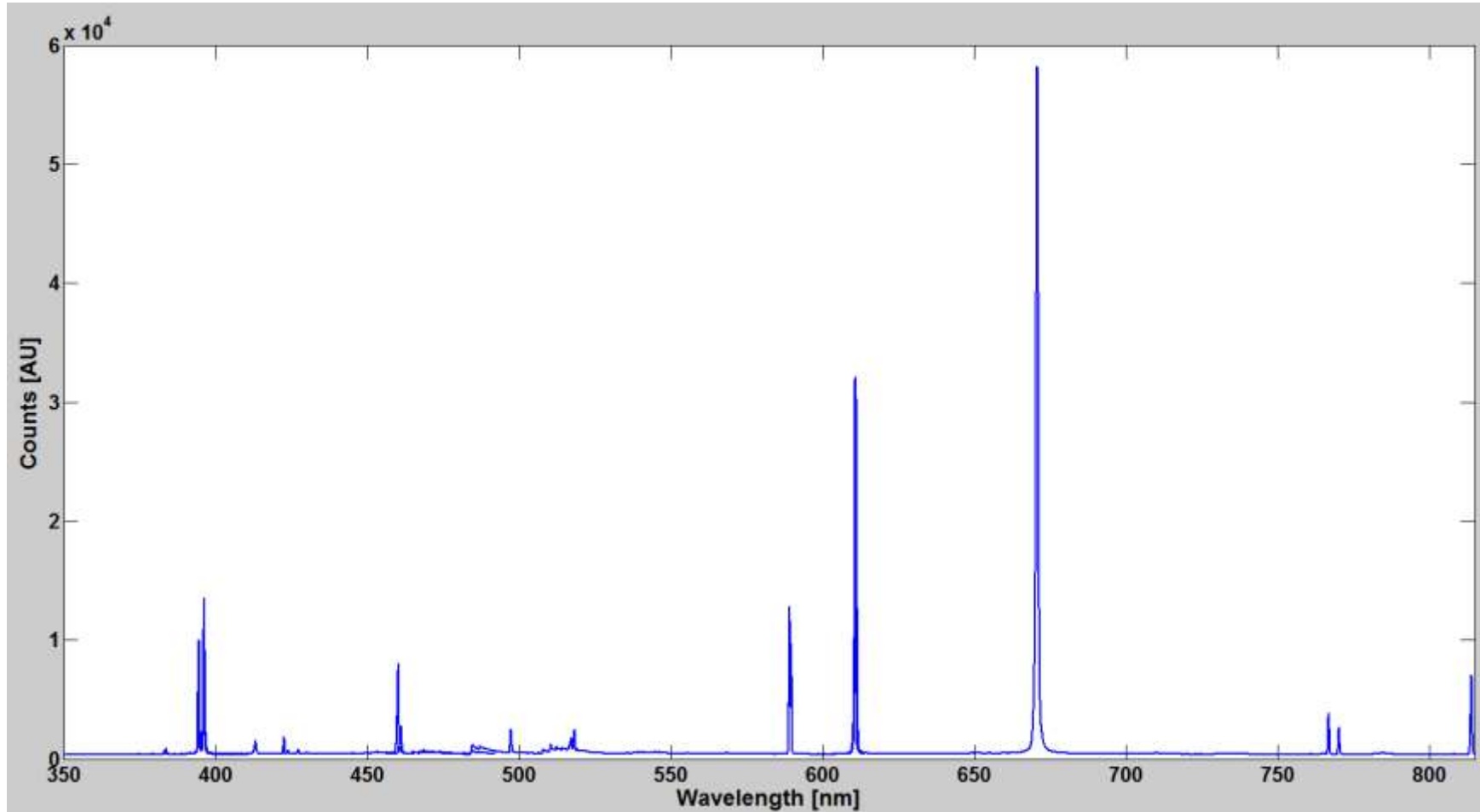


- ❖ First development project for a combined Raman and LIBS instrument at TNO for ESA's ExoMars: 1<sup>st</sup> mission to planet Mars
- ❖ Objectives: search for signs of present or past life
- ❖ TNO built fully functional spectrometer, but it was never launched for political reasons
- ❖ SPECTRAL is producing and selling the evolved version of this instrument for applications on Earth

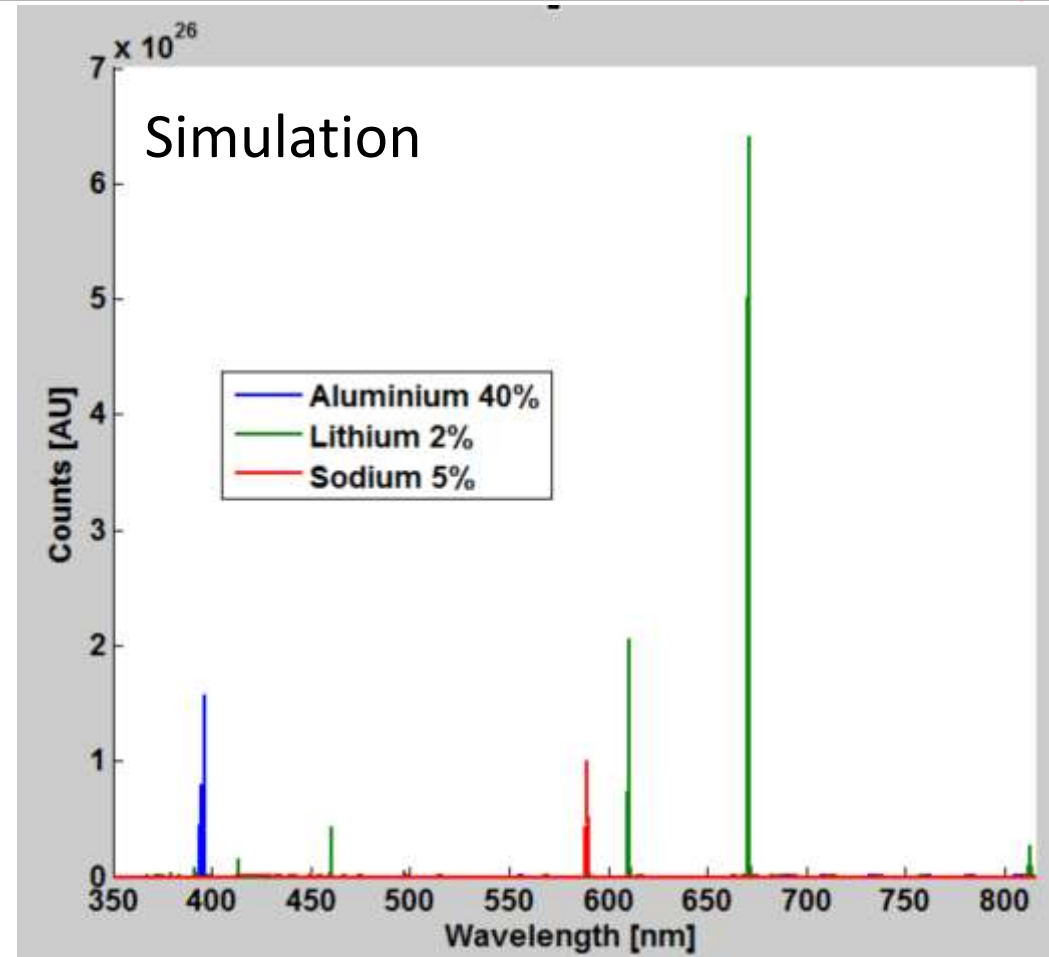
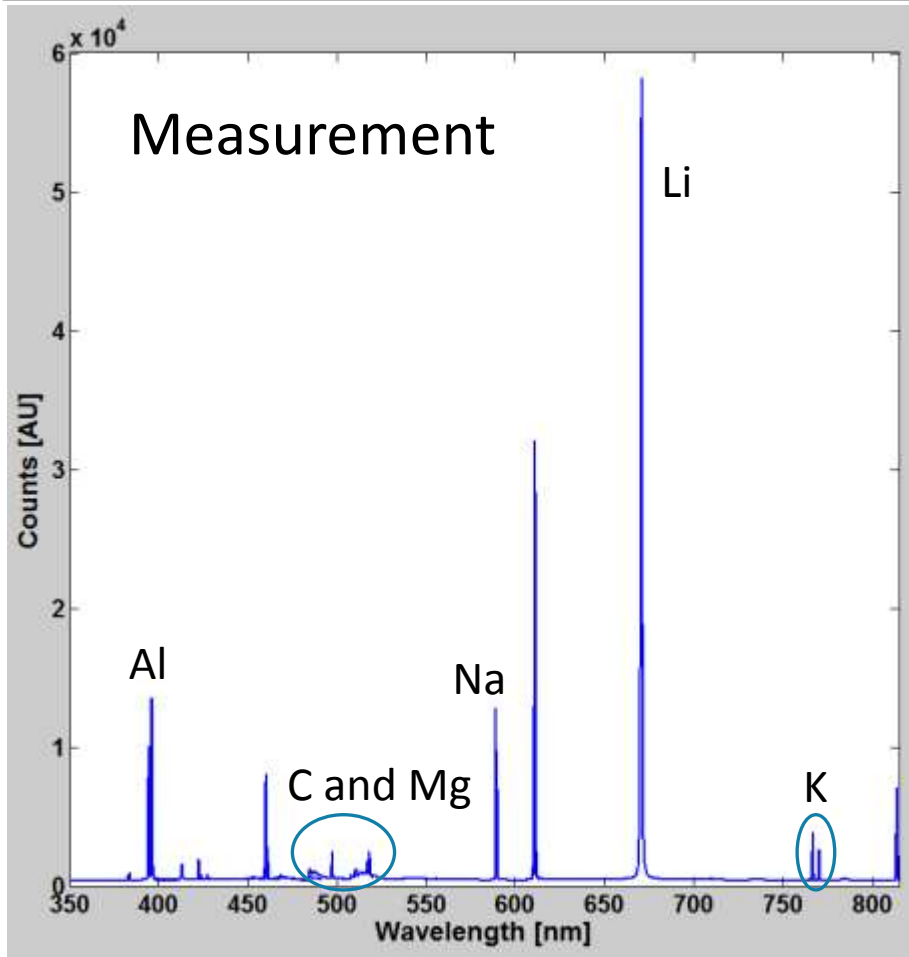




# A typical LIBS measurement



# The interpretation



# LIBS versus other techniques



	LIBS	Atomic emission	Atomic absorption	Rontgen (XRF)	Mass spectroscopy
Able to measure the whole periodic table	✓	✓	✓	✗	✓
Able to measure parts per billion levels	✗	✓	✓	✓	✓
Able to be quantitative	✓	✓	✓	✓	✓
Able to measure over >1m distances	✓	✗	✗	✗	✗
Able to measure faster than 1Hz	✓	✗	✗	✗	✗
Works without the use of disposables	✓/✗	✗	✗	✓/✗	✗



# Our product

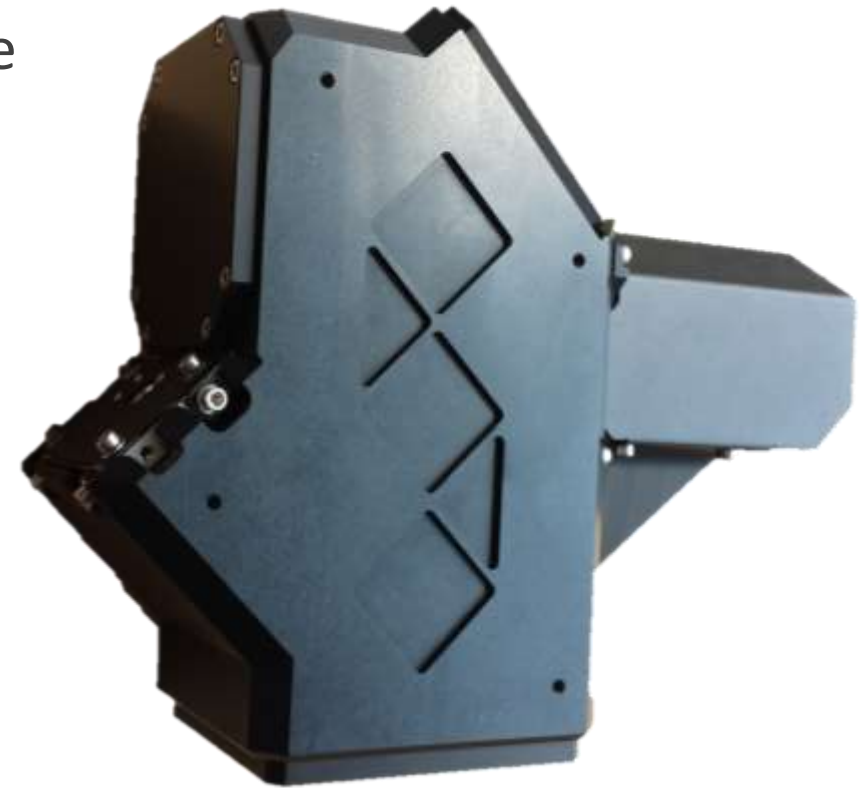
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1. Continuous monitoring: many measurements per sec., non-contact, typically 0.1-1 meter from sample
2. Robust design, very low temperature influence and able to withstand harsh environments
3. Can be applied to combine Raman and LIBS function in one instrument: both molecular and elemental information from one instrument

Typical applications:

- ❖ Monitoring the composition of a stream of raw materials, semi-finished products or end products. This can be solids, liquids or gasses







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Thank you for your attention!  
Questions?

[www.spectralindustries.com](http://www.spectralindustries.com)

Email: [info@spectralindustries.com](mailto:info@spectralindustries.com)

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