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## *Spectrolaser Application*

### **Analysis of Tungsten Carbide Coatings**

#### ***Material***     *Tungsten Carbide Alloy Coatings*

11 Tungsten Carbide alloy coating samples were submitted to Laser Analysis Technologies by Cerametal. The coatings consisted of various alloys of Co, W, V, Cr, Ti, Ta and Nb.

#### ***Test Method***

The supplied coated samples were presented to the Spectrolaser 1000M as calibration standards. Calibration curves were obtained for the principal alloy components. One of the samples (sample I) was also presented 5 times as an unknown.

The analysis time is 20 seconds (all elements) for each sample using 100 laser pulses. Precision can be improved further with longer analysis times.

#### ***Detectable Elements***

Detectable elements include the principal alloy components Co, W, V, Cr, Ti, Ta and Nb in addition to various trace contaminants (Ca, Mg, Na, K, etc.)

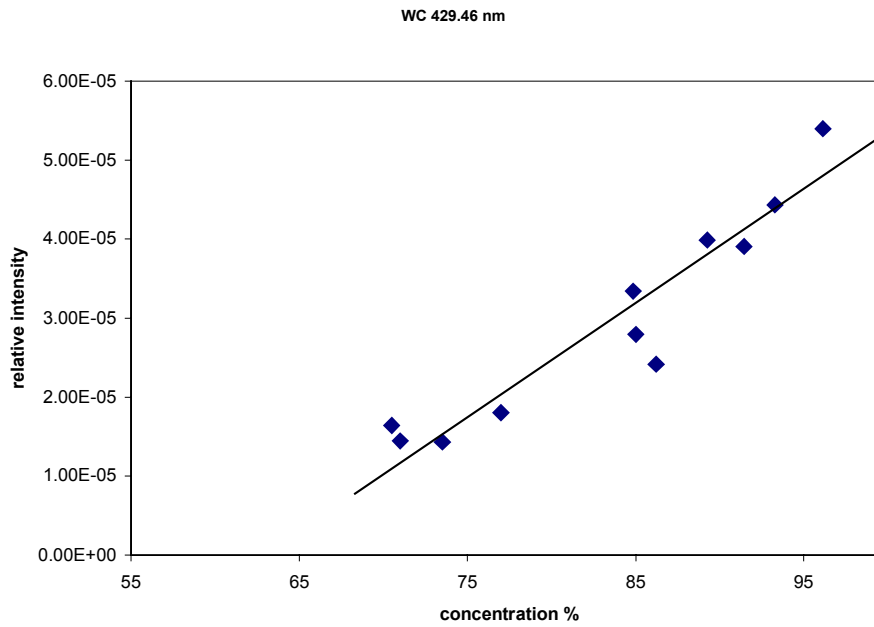
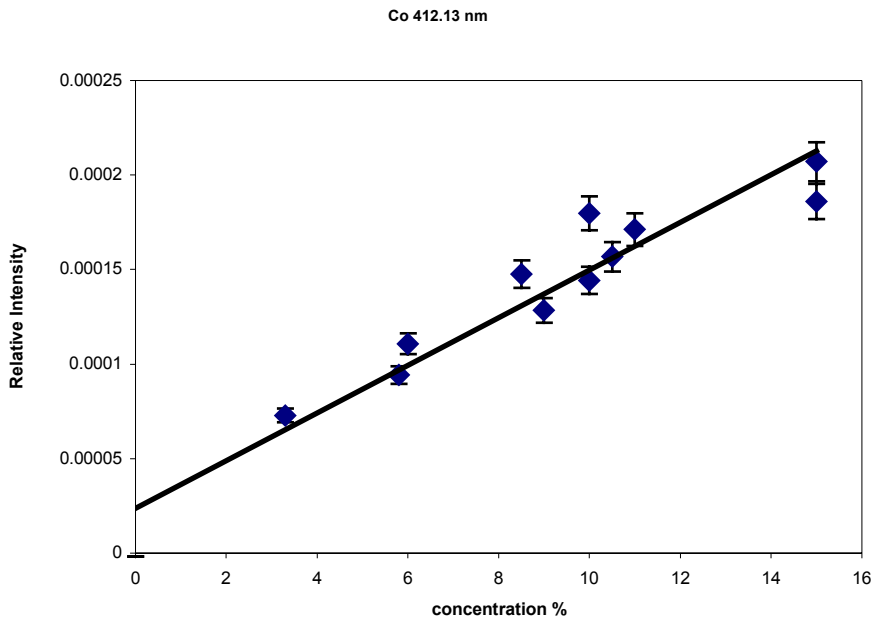
## ***Detection Limits***

Detection limits are determined from three times the standard deviation in multiple measurements of materials of samples with low analyte concentrations. Only one of the alloy components is present in trace amounts (<0.05%) in these materials, i.e. Vanadium. The calculated detection limit for Vanadium Carbide is given below.

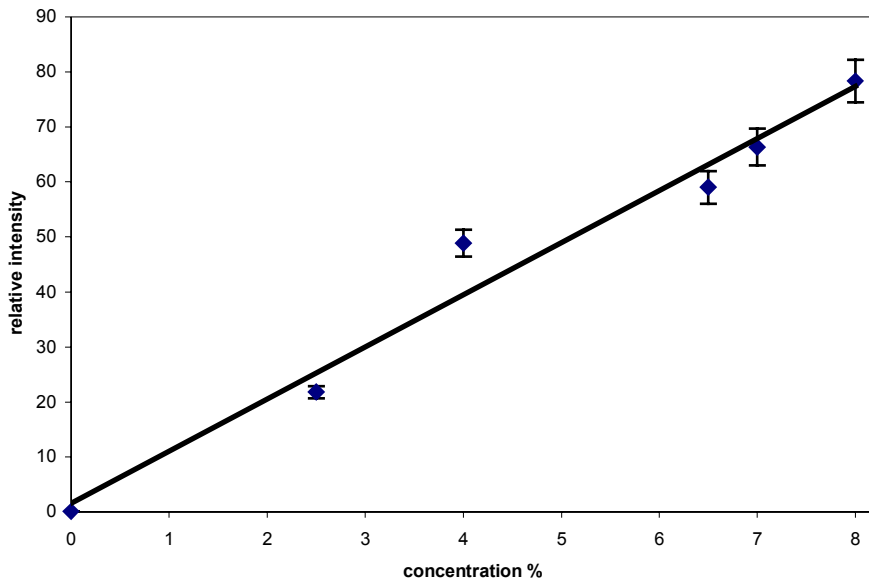
Compound	Emission Line (V)	Detection Limit
VC	309.31 nm	0.003 %

# Calibration Curves

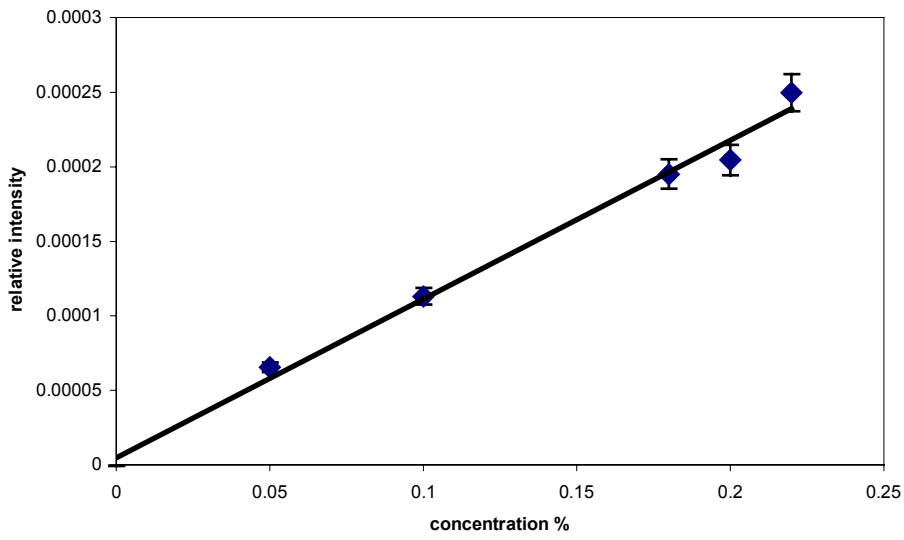
Example calibration curves for the various detectable elements are shown below.



TiC 453.323 nm



VC 309.31 nm



## Example Multiple Analysis Test

Calibration Standard I, Co:W:V:C alloy

Sample	Co % 412.13	W % 429.46	V % 309.31
1	8.70	89.40	0.05
2	8.80	90.00	0.05
3	9.50	89.50	0.05
4	8.80	87.80	0.05
5	8.30	90.10	0.05
<b>Mean (SD)</b>	<b>8.8 (0.2)</b>	<b>89.4 (0.4)</b>	<b>0.05 (-)</b>
<b>Predicted</b>	<b>8.5 (-)</b>	<b>91.4 (-)</b>	<b>0.05 (-)</b>