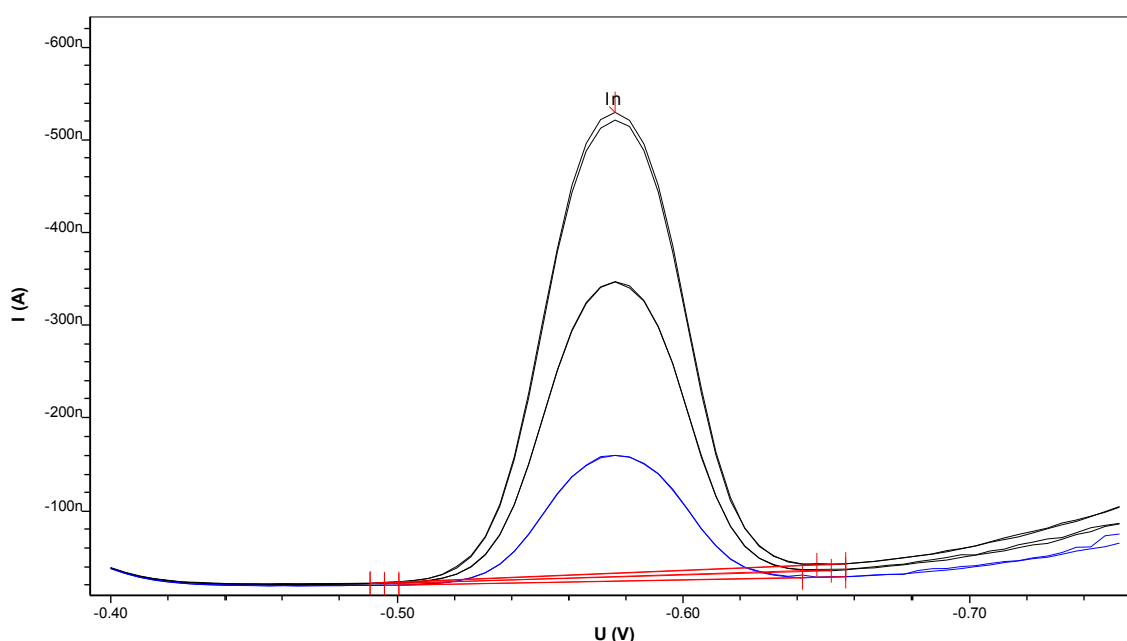


Determination of indium in electrolyte solutions for production of copper indium gallium selenide (CIGS) solar cells



Indium can be determined in electrolyte solutions used in production of copper indium gallium selenide solar cells – also called CIGS cells – for the electrodeposition of the CIGS absorber layer.

The determination of indium is carried out by polarography after dilution of the sample in supporting electrolyte.

Results

In in CIGS electrolyte solution

296 mg/L

Method description

Sample

Electrolyte solution containing sulfuric acid

Sample preparation

No sample preparation necessary.

Electrodes

Multi-Mode Electrode pro	6.1246.120
Non-silanized glass capillaries	6.1226.030
Ag/AgCl/ KCl (3 mol/L) reference electrode. Bridge electrolyte c(KCl) = 3 mol/L.	6.0728.020 6.1245.010
Platinum rod electrode	6.0343.000

Equilibration time	5 s
Start potential	-0.4 V
End potential	-0.75 V
Pulse amplitude	0.05 V
Potential step	0.005 V
Potential step time	0.8 s
Sweep rate	0.006 V/s
Peak potential In	-0.57 V

Reagents

NaH ₂ PO ₄	Sodium dihydrogen phosphate monohydrate, for analysis
HCl	Hydrochloric acid, for trace analysis*, w(HCl) = 30%
In standard stock solution	β(In ³⁺) = 1 g/L, commercially available
Ultrapure water	Resistivity >18 MΩ·cm (25 °C), type I grade (ASTM D1193)

*e.g., Merck suprapur®, Sigma-Aldrich TraceSelect® or equivalent.

Solutions

Supporting electrolyte	w(NaH ₂ PO ₄) = 10% c(HCl) = 1 mol/L
Hydrochloric acid	w(HCl) = 30%
In standard solution	β(In ³⁺) = 100 mg/L

Analysis

Measuring solution	10 mL supporting electrolyte + 3 mL w(HCl) = 30% + 25 µL undiluted sample
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Parameters

Working electrode	DME
Stirring speed	2000 min ⁻¹
Mode	DP
Purge time	300 s

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