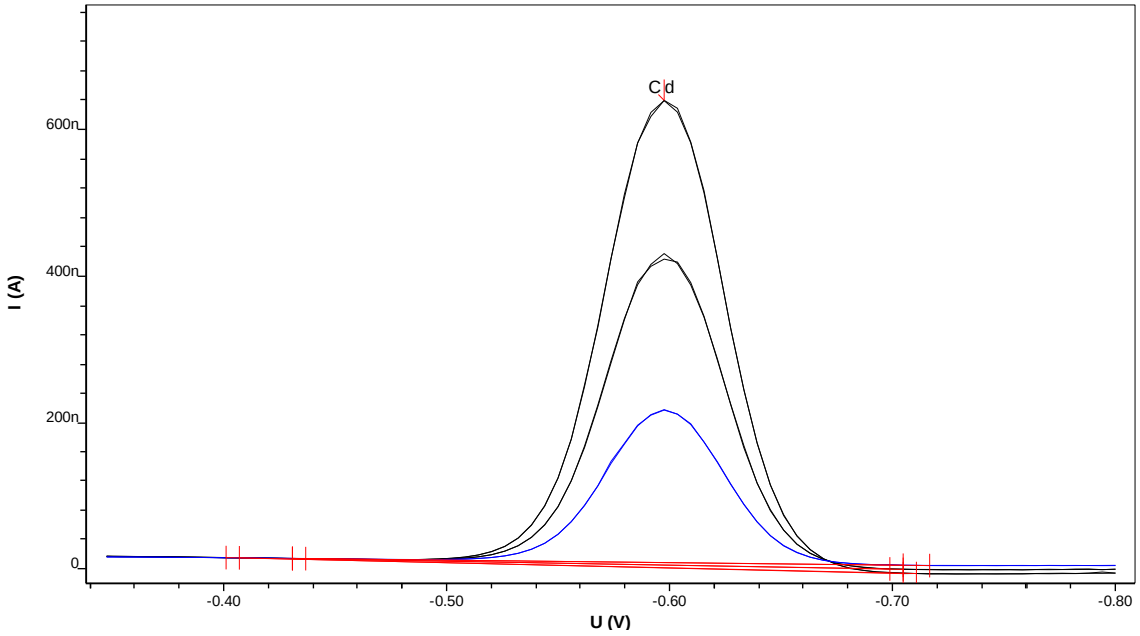
VA Application Note V-207

Cadmium in electrolytes for production of copper indium selenide (CIS) or copper indium gallium selenide (CIGS) solar cells



Cadmium can be determined in electrolyte solutions used in production of copper indium selenide solar cells – also called CIS cells – or copper indium gallium selenide solar cells – also called CIGS cells. The electrolyte solutions are used for chemical bath deposition (CBD) of a CdS layer on top of the CIS or CIGS absorber layer.

The determination of cadmium is carried out by polarography.

Results

Cd in electrolyte solution
484 mg/L

Metrohm

Method description

Sample

Electrolyte solution for chemical bath deposition (CBD)

Sample preparation

No sample preparation necessary.

Electrodes

Multi-Mode Electrode pro Non-silanized glass capillaries	6.1246.120 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

Reagents

KCl	Potassium chloride, for analysis
CH_3COOH	Acetic acid, w(CH_3COOH) = 100%, for trace analysis*
NaOH	Sodium hydroxide solution, w(NaOH) = 30%, for trace analysis*
Cd standard stock solution	ß(Cd^{2+}) = 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

Buffer solution	c(KCl) = 1.5 mol/L c(CH_3COOH) = 0.5 mol/L c(NaOH) = 0.5 mol/L
Cd standard solution	ß(Cd^{2+}) = 1 g/L

Analysis

Measuring solution	10 mL ultrapure water + 1 mL buffer solution + 50 µL sample

Parameters

Working electrode	DME
Stirring speed	2000 min^{-1}
Mode	DP
Purge time	300 s
Equilibration time	5 s
Start potential	-0.35 V
End potential	-0.8 V
Pulse amplitude	0.05 V
Potential step	0.006 V
Potential step time	0.6 s
Sweep rate	0.01 V/s
Peak potential Cd	-0.6 V