

# Technical Data Sheet

## Electrolyte for Aluminum Plating Based on 1-Ethyl-3-methylimidazolium tetrachloroaluminate 1:1.5

Revision Date: 10/20/2016

Date Issued: 7/22/2017

### 1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

<b>Product name</b>	<b>1-Ethyl-3-methylimidazolium tetrachloroaluminate 1:1.5</b>
<b>Product code</b>	EP-0001
<b>CAS</b>	not available
<b>Supplier</b>	IoLiTec Ionic Liquids Technologies GmbH Salzstrasse 184 D – 74076 Heilbronn Germany
<b>Telephone</b>	+49 (0)7131-89839-0
<b>Fax</b>	+49 (0)7131-89839-109
<b>Emergency telephone</b>	+49 (0)179-5322578
<b>Email</b>	info@iolitec.de

### 2 COMPOSITION/INFORMATION ON INGREDIENTS

<b>Ingredient name</b>	<b>1-Ethyl-3-methylimidazolium tetrachloroaluminate, aluminum chloride</b>
<b>CAS No.</b>	not available
<b>Empirical Formula</b>	not available
<b>Structure</b>	not available
<b>Molecular weight</b>	not available
<b>Purity</b>	>98%

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### 3 PROPERTIES

<b>Color</b>	yellowish
<b>Physical state (25 °C)</b>	liquid
<b>Melting point</b>	<10 °C
<b>Glass transition temperature</b>	not available
<b>Decomposition temperature</b>	not available
<b>Density (25 °C)</b>	not available
<b>Viscosity (25 °C)</b>	not available
<b>Heat capacity (25 °C)</b>	not available
<b>Conductivity (20 °C)</b>	not available
<b>Electrochemical stability window</b>	not available
<b>Anodic limit</b>	not available
<b>Cathodic limit</b>	not available

### 4 CO-SOLVENT MISCIBILITY

<b>Water</b>	reacts violently with water forming HCl Gas
<b>Acetone</b>	miscible
<b>Acetonitrile</b>	not available
<b>Isopropanol</b>	not available
<b>Toluene</b>	not available
<b>Hexane</b>	not available

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### 5 APPLICATION GUIDELINES

This electrolyte should be stored and handled under dry, inert gas like argon or nitrogen. After filling the electrolyte into the plating bowl it should be mixed for at least 15 min. The material of the plating bowl should be glass or teflon coated metal. For the plating process the cathode should be the working electrode with the sample that should be coated and the anode should be out of aluminum (99.99+%). The anode to cathode ratio should be approximately 1:1. To receive an optimal performance of the electrolyte, the electrode materials should be cleaned prior to use. Therefore we suggest to sonicate the plates for 20 min with hexane and for another 20 min with acetone. After that the aluminum plate should be dipped in a mixture of 30% phosphoric acid, 30% sulfuric acid and 40% nitric acid. The further cleaning process of the workpart depends on its material. We suggest to clean copper or steel with a solution of 10 M hydrochloric acid. The electrode materials should be cleaned first with water and then with acetone after the handling with acids. The last step of the cleaning procedure is drying of the electrode materials. The optimal distance between the electrodes is determined by the dimensions of the electrodes. For small plates of 10.7 cm<sup>2</sup> (complete surface including opposite of the counter electrode) the optimal distance is at 1.5 cm. We received the best plating results by using a current density of 6.3 mA/cm<sup>2</sup> at 30 °C with moderate stirring. For bigger workparts of 31 cm<sup>2</sup> an electrode distance of 3 cm and a current density of 11.3 mA/cm<sup>2</sup> is suggested. The deposition should be done under current control. With a sample program as follows:

Area: 10.7cm<sup>2</sup>, distance electrodes 1.5 cm, Material Cu

0.05 A for 20s → -0.065 A for 200s → 0.05 A for 20s → -0.065 A for 200s

Repetition of this program depending on the requested layer thickness.

The optimal voltage for the deposition process lies between 0.8 and 1.2 V. If the voltage exceed those values the current must be reduced or the distance between the electrode must be reduced. Higher voltages of 3V or more will decompose the electrolyte and will result in black coatings. The cleaning of the workparts should be

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performed by rinsing them with dry 1-ethyl-3-methylimidazolium dicyanamide (IL-0003-HP) or by rinsing it with acetone followed by stirring for 10 min with 3M™ Novec™ 7300 Engineered Fluid (FL-0003-HP). After that the workpart should be cleaned over a separate bowl with acetone. It is important that you do not add a big amount of acetone or water to the electrolyte because this will reduce the performance of the electrolyte.

### 6 ORDER INFORMATION

EP-0003-HP can be obtained in the following standard quantities:

Quantity	Price
25 g	Please enquire
50 g	Please enquire
100 g	Please enquire
250 g	Please enquire
500 g	Please enquire
1 kg	Please enquire
Bulk	Please enquire

Please send your order via email to [order@iolitec.de](mailto:order@iolitec.de) or fax +49 (0)7131 – 89839109.

### 6 OTHER INFORMATION

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