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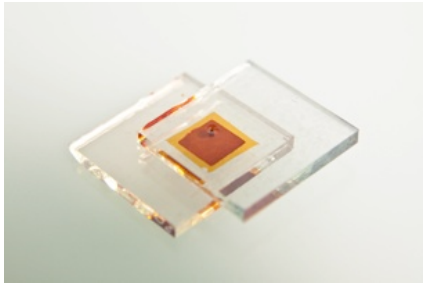
Mosalyte TDE-250

The Ultimate High Performance Non-Volatile Electrolyte

For researcher and industry scientists who study or manufacture Dye Solar Cells, Mosalyte TDE-250 is a high performance ionic liquid electrolyte that will vastly improve the stability of your dye-sensitized solar cells.

This product is of highest quality and has been proven in real solar cells.



Characteristics

Aspect	brown viscous liquid
Redox Couple	iodide / tri-iodide
Redox Content	ca. 160 mM
Additives	alkylbenzimidazole
Ionic Liquid Content	1-ethyl-3-methylimidazolium iodide; 1,3-dimethylimidazolium iodide; 1-ethyl-3- methylimidazolium tetracyanoborate
HS Code	2801.2000

The research leading to this product has received funding from the European Union Seventh Framework Programme (FP7/2007- 2013) under grant agreement n° 229036, FP7-NMP-2008-LARGE-2, Project ORION.

Retail Quantities

5 g	ref. 32750
10 g	ref. 32711
20 g	ref. 32721
50 g	ref. 32751
100 g	ref. 32712
200 g	ref. 32722
500 g	ref. 32752
1 kg	ref. 32713

Pricing on product page:
solx.ch/mostde250

How to Order

Please visit our webshop at shop.solaronix.com, or send us an e-mail or fax indicating your desired products.

Bulk Supply

In addition to the retail quantities listed above, Mosalyte TDE-250 is also available in bulk for industrial purpose. Please inquire.

USAGE

Before using Mosalyte TDE-250 make sure the liquid is perfectly clear without any trace of solid. At low temperature crystallization may occur, in such a case heat the product at 70°C until it's perfectly clear again.

A few drops of Mosalyte TDE-250 are typically used to fill the gap between the photo-anode and cathode of small surface area test cells. For larger cells, and for modules, more Mosalyte is necessary. The filling operation may be completed with a single filling hole by vacuum back-filling using a vacuum chamber or our Vac'n'Fill Syringe. Alternatively, two filling holes can be used to inject and draw through the Mosalyte.

For small cells with a single filling hole: Place a drop of Mosalyte on the filling hole and place the cell in a vacuum chamber. Evacuate the chamber without being concerned about solvent evaporation, there is none! After attaining a pressure of <10 mbar, break the vacuum and expose the chamber to ambient pressure. The vacuum formed inside the cell will pull the electrolyte into the cell. Alternatively use the Vac'n'Fill Syringe as described in the accompanying literature.

For larger cells and modules with a single filling hole it is necessary to place a reservoir over the filling hole containing ca. 0.5 mL of electrolyte solution. A pipette tip cut into a cylinder with two open ends and attached with hot-melt glue works well for this application. It is helpful to gently heat larger surface area cells and modules to decrease the viscosity of Mosalyte and facilitate easier flow inside the cells.

Common Pitfalls

Mosalyte TDE-250 may crystallize at around 15 °C. Using the electrolyte in these conditions may change the ratio of the various component and lead to unexpected cell performance.

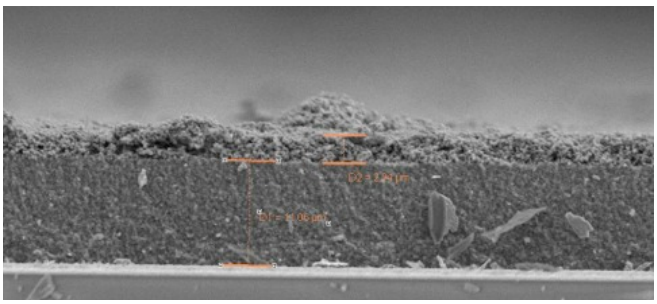
Mosalyte TDE-250 is hygroscopic. While in use avoid leaving the container open unnecessarily.

Care must be exercised during vacuum back-filling. While there is no solvent to evaporate, it is possible to pump off the iodine in the mixture. This will change the redox ratio which will affect the performance. Pumping off iodine may also be detrimental to the vacuum pump. An activated charcoal filter will minimize pump damage.

EXAMPLE

Performance Assessment with Mosalyte TDE-250

State of the art test cells were prepared with several titania photo anodes (36 mm^2) printed on TCO 22-15 glass (2.2mm thick and 15 Ohm/sq). The glass was washed and pre-treated with a 40 mM $TiCl_4$ solution in water at 70°c for 30 minutes. The TiO_2 layering used was as follows (see SEM cross section below): ca. 11 microns of Ti-Nanoxide HT/SP and 3 microns of Ti-Nanoxide R/SP. After sintering at 450°C, a $TiCl_4$ post-treatment was performed to optimize the porosity and specific surface area of the TiO_2. The photoanodes were then sensitized using Ruthenizer 535-BisTBA dye, 0.5 mM solution in ethanol, in presence of 5 mM of chenodeoxycholic acid.

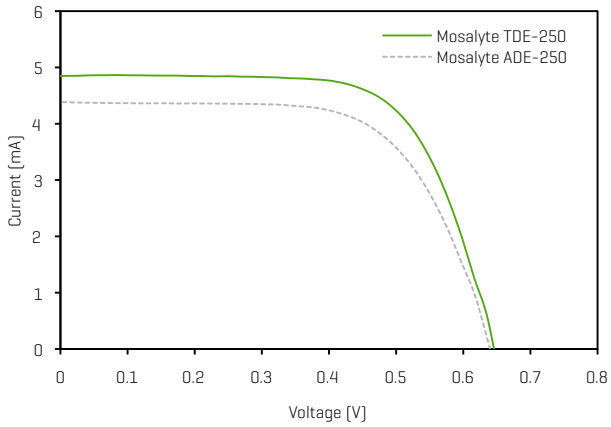


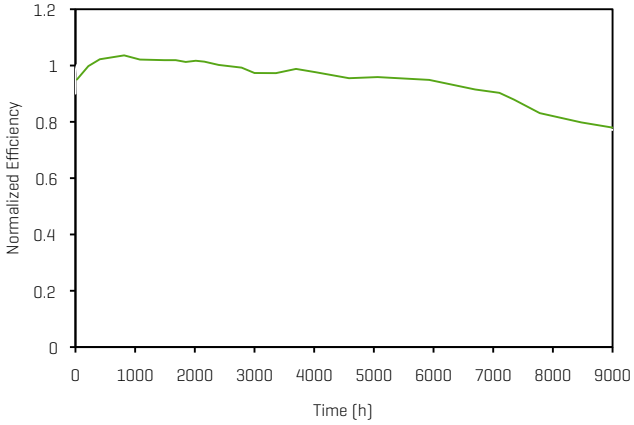
SEM cross section of mesoporous titania photo anode

Counter electrodes were prepared by painting three layers of Platisol T, leading to the formation of catalytic platinized catalyst surface after firing at 450 °C.

The photoanodes and cathodes were laminated together using a 25 microns gasket (Meltonix 1170-25) to minimize mass transport limitations due to the relatively high viscosity of the ionic liquid mixture. The cells were then vacuum backfilled with Mosalyte TDE-250.

The I-V performance of these cells was measured in full sun (1000 W/m^2, AM 1.5G). For accurate measurements, the cells were masked and the values are given as an average over 5 cells. The characteristics of the cells were found to be V_{oc} = 646 mV, J_{sc} = 13.45 mA/cm^2 and FF = 0.68 leading to an efficiency of 5.9%. Reducing the light intensity to 100 W/m^2 (1/10 sun) led to an efficiency of 6.6%.





V_{oc} 646 mV

J_{sc} 13.45 mA/cm^2

FF 0.68

Eff. 5.9 % (or 6.6% at 1/10 sun)

Stability Assessment with Mosalyte TDE-250

Cells were prepared according to the previously described procedure. For optimal cell protection a secondary sealing (Amosil 4) was applied on the edges of the devices and a UV filter was used.

The cells were then placed at 65°C under continuous illumination (1000 W/m^2, AM 1.5G) in a Solixon A-65 light soaker. Under theses conditions the cells showed less than 1% efficiency loss over 1000 hours and around 10% efficiency loss over 7000 hours.

This remarkable stability feature makes Mosalyte TDE-250 an excellent candidate for fabricating stable devices for outdoor applications. Organic solvents not only present challenges for sealing but also permeate across polymer membranes, excluding their use in flexible cells. In comparison, the vapor pressure of Mosalyte TDE-250's components and their permeation rate across polymer membranes are negligible at the typical operating temperature of photovoltaic devices.

STORAGE AND SAFETY

Storage

Store the product in its original container, upright and tightly sealed. Keep in a dry place at room temperature, away from light exposure.

The product is not known to suffer from degradation when stored properly. Consider filling the container with inert gas for very long term storage.

While in use, avoid leaving the container open unnecessarily.

Safety

Mosalyte TDE-250 is for research and development use only and is intended to be manipulated by trained personnel. Ensure good ventilation of the workplace and wear suitable protective equipment.

Signal word: Warning

For a complete description of safety measures, please refer to the Material Safety Datasheet (MSDS) of Mosalyte TDE-250.

solaronix.com/msds/

RELATED PRODUCTS

Cited in This Document

- TCO22-15, 15 ohm/sq FTO-coated glass substrate.
- Ti-Nanoxide HT/SP, screen-printable titania nanoparticles paste.
- Ti Nanoxide R/SP, screen-printable reflective titania paste.
- Platisol T, platinum precursor paint.
- Ruthenizer 535-bisTBA, ruthenium photo-sensitizer.
- Chenodeoxycholic Acid, staining additive
- Meltonix 1170-60, hot-melt sealing films.
- Amosil 4, two-component sealing glue.
- UV Filter Adhesive Film.

Consider Also

- Mosalyte TDE-025, lower concentration analogue.
- Iodolyte HI-30, high performance electrolyte.

Find Out More

Visit the Chenodeoxycholic Acid product page for more information: solx.ch/mostde250

How to Order

Please visit our webshop at shop.solaronix.com, or send us an e-mail or fax indicating your desired products.

Feedback

Do you have any comments or suggestions? Help us improve this document, contact us at materials@solaronix.com