

Huntsman is one of the world's largest producers of amine chemistries. Our **E-GRADE®** products can be used in formulation of process materials for Semiconductor, Display and other electronics. This broad product portfolio gives flexibility in expanding the options for any application and includes our high purity aprotic solvents in **ULTRAPURE™** grades for lithium-ion batteries and low trace metal **E-GRADE®** quality for microelectronic applications.

PRODUCT OVERVIEW

E-GRADE® MEOX is a polar aprotic solvent well suited for use in a wide range of applications due to its excellent solvency, relatively high flash points, low vapor pressure, and ease of handling. It is soluble in most organic solvents and water. Typical applications for **E-GRADE® MEOX** includes photoresist stripper, de-fluxing, and post-etch residue removal (PERR) cleans in the production of semiconductors.

E-GRADE® MEOX can also be used as an NMP alternative in lithium battery cathode slurries or as an electrolyte solvent in electrochromic glass.



BENEFITS

- Ease of handling
- Excellent solvency
- Low vapor pressure
- Improved EHS profile
- Aprotic
- Water soluble and easily rinseable
- Stripping and cleaning
- Alternative to DMSO or NMP

PRODUCT GRADES

Grades	SEMI Standard	Typical PPB
E-GRADE®	VLSI	<20
E-GRADE® ULM	Grade 2	<10
E-GRADE® SLM	Grade 3	<2

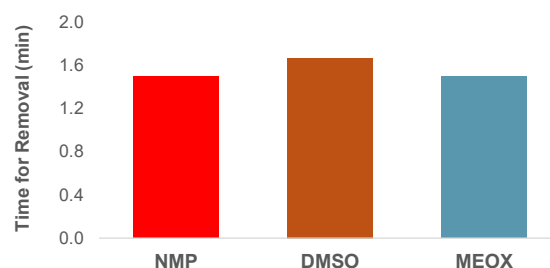
TYPICAL PROPERTIES

	NMP (Reference)	DMSO (reference)	E-GRADE® MEOX
Structure			
Molecular Weight	99	78	101
Viscosity (cP@25°C)	1.7	1.1	3.0
Flash Point (°C, cc)	86	89	113
BP (°C)	202	189	225
MP (°C)	-25	18.5	15
Contact Angles on Al (100 wt%)*	54.1	62.4	62.5
VOC (ppm)**	1558	302	19
Dipole Moment	4.09	3.96	4.13
Solubility Parameter			
dD	18.0	18.4	18.1
dP	12.3	16.4	10.9
dH	7.2	10.2	11.8

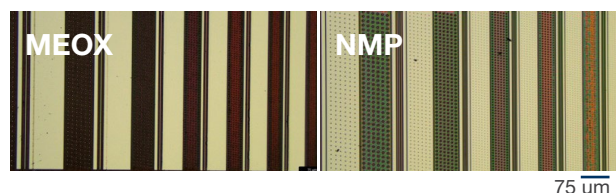
* Contact angle measurements were collected with neat NMP and MEOX on aluminum substrate using Dataphysics OCA 25 Instrument.

** VOC measurements were recorded with Honeywell MiniRAE 3000+ Photoionization Device at room temperature, 25% humidity.

Solvent Photoresist Removal



AZ1500 Photoresist removal at room temperature shows comparable performance of MEOX to other common solvents.



Positive Novolak photoresist patterned on 4 inch bare wafer followed by hard baking patterned wafer at 185°C for 2 min. The wafer was then stripped in solvent at 50°C for 5 min, and the photoresist pattern checked by microscope.

SOLUBILITY GUIDE

The solubility of various materials was tested in multiple concentrations at 60°C, demonstrating that these solvents can be used as primary or cosolvents for these materials and offer alternatives to NMP. The maximum weight percent found to be soluble is listed below, however higher concentrations may be possible for some.

Material	PS	PMMA	BTR	BPDA	BTDA	ODPA	PMDA	6FDA	3,4'-ODA	pPDA
N-methyl-2-pyrrolidinone NMP	40%	40%	30%	5%	30%	10%	10%	30%	30%	30%
3-Methyl-2-Oxazolidinone E-GRADE® MEOX	15%	40%	30%	<5%	10%	10%	5%	10%	30%	30%

PS : Polystyrene (M_w=195K)

PMMA : Polymethylmethacrylate

BTR : Benzoxazine thermoset Resins (ARALDITE® MT 35600 & MT35700)

BPDA : Biphenyl-tetracarboxylic acid dianhydride

BTDA : Benzophenone-tetracarboxylic dianhydride

ODPA : 4,4'-Oxydiphthalic anhydride

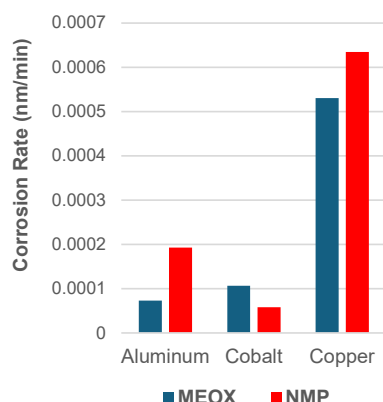
PMDA : Pyromellitic dianhydride

6FDA : 4,4'-(Hexafluoroisopropylidene) diphthalic anhydride

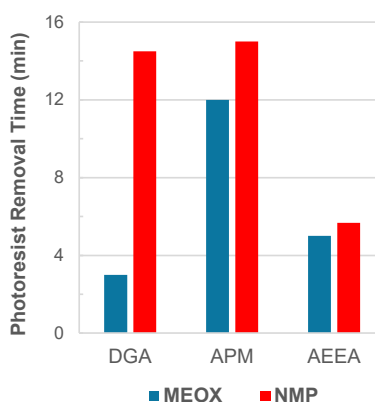
3,4'-ODA : 3,4'-Oxydianiline

pPDA : p-Phenylenediamine

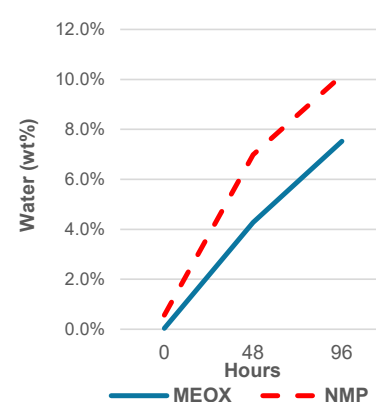
APPLICATION TESTING



Low corrosion rates of both pure solvents confirmed by linear polarization resistance testing.



AZ1500 was post-treated and removed with a 50/50 blend of solvent and amine at room temperature. Results show MEOX had better removal times than NMP in all mixtures.



Multi-day study in high moisture environment indicates that MEOX absorbs less water from the environment than NMP.

For more information, contact your local Huntsman representative. www.huntsman.com / AdTech@huntsman.com

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