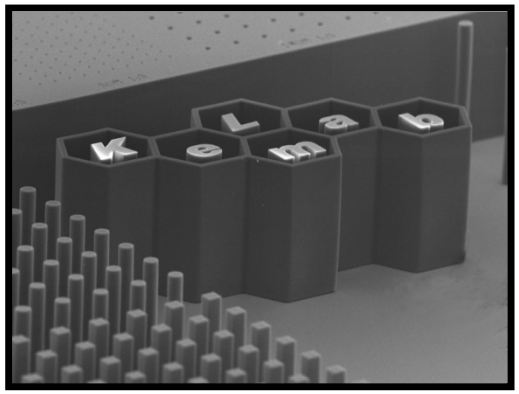
PHOTORESIST MANUFACTURING & INNOVATION

KemLab HARE SQ: Negative Tone Epoxy Alternative to SU-8



KemLab HARE SQ:
Negative Tone Epoxy Alternative to SU-8

HARE SQ is a negative epoxy photoresist designed for polymeric MEMS, microfluidics, micromachining, and other microelectronic applications. This resist has excellent chemical, mechanical and thermal resistance, making it suitable for permanent applications. HARE SQ is sensitive to NUV, i-line and broadband wavelengths.

- Film thickness: 2 to 100+ microns
- Superior cleanliness and optical clarity
- Consistent surface energy
- Excellent reproducibility
- Fully compatible with SU-8 processes

HARE SQ Advantages - *Start with better materials, make a better product.*

PRICE

HARE SQ is designed to be competitive in the market with a price that beats the competition. Better quality for less cost.

QUALITY

HARE SQ uses superior epoxies specially designed for the electronics industry, making improvements in optical transparency, particles and filter-ability, cured surface energy consistency, and photoresist lot-to-lot consistency versus industry competitors.

1. **Base Material is Improved**
   - HARE SQ uses a superior epoxy resin
2. **Quality parameters are more tightly controlled**
   - Surface energy
   - Transparency / Color
   - Reproducibility
   - Cleanliness

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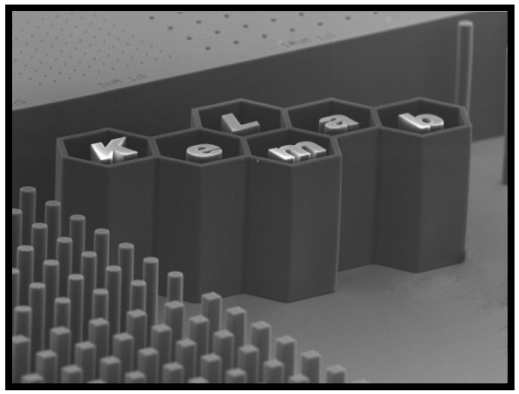
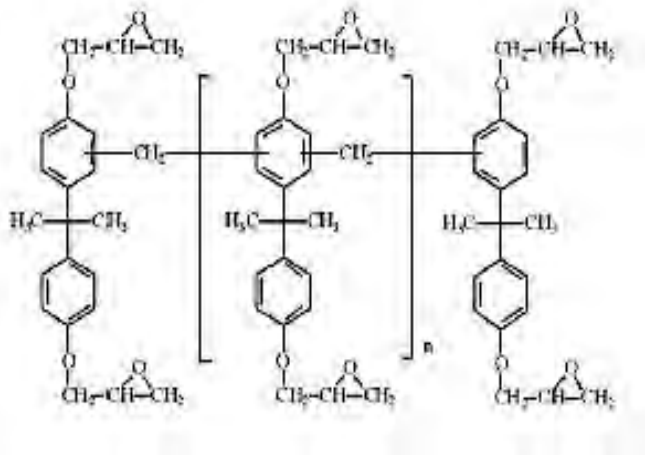
Materials Overview for HARE SQ



HARE SQ and SU-8 are the same epoxy chemistry

HARE SQ and SU-8 are the same epoxy chemistry. They both have the same EEW (epoxy equivalent weight) and an average number of epoxies of 8 (4 monomeric) units, n = 4.

Glycidyl ether epoxy resin with multifunctional BPA phenolic groups



HARE SQ uses a superior quality resin

HARE SQ uses a superior quality resin. This resin produces a superior photoresist with highly consistent properties lot to lot. HARE SQ resin is specifically made for microelectronic applications, so it is cleaner and more consistent. HARE SQ is manufactured in a *continuous* process versus SU-8 which is manufactured in a *batch* process.

Note the very wide specification on viscosity of SU-8. This is indicative of lot-to-lot consistency problems when made into photoresist.

Competition: EPON SU-8 is manufactured by Hexion, specification below:

Property	Value	Unit
Color	6 max.	Gardner
Epoxide Equivalent Weight	195 - 230	g/eq
Viscosity at 130°C	10 - 60	P

Data is public domain and provided for comparative purpose only, ref: http://www.hexion.com/en-US/product/epon-resin-su-8

HARE SQ resin is visually cleaner and less yellow

HARE SQ resin is visually cleaner and less yellow. As can be seen below, the HARE SQ resin is cleaner, and more transparent material. This leads to fewer particles, more opacity, and fewer micro-bubbles in the final photoresist. Resulting in product with more lot to lot consistency.

HARE SQ Epoxy Resin SU-8 Resin

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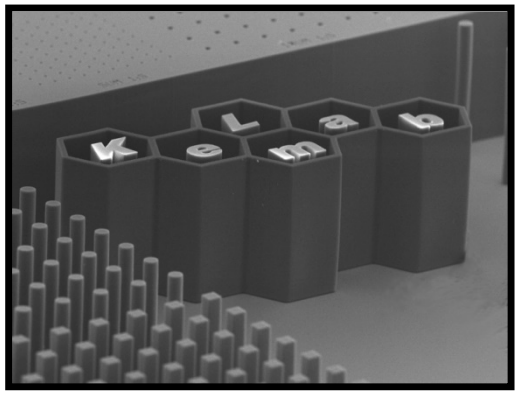
Quality Control Parameters for HARE SQ



More photoresist quality testing is performed on HARE SQ

More photoresist quality testing is performed on HARE SQ.
KemLab includes extra quality testing reported on the CoA, that the competition does not.

Surface Energy

- Indicate cross-link consistency and crosslink density
- Demonstrate adhesion consistency
- Especially relevant to microfluidic applications where fluids come in contact with the polymeric MEMS structure

Gardner Color

- Demonstrate cleanliness of HARE SQ resist
- Ensure lot-to-lot consistency

CoA Example

H.A.R.E. 50 25

Superior Quality
High Aspect Ratio Epoxy

Certificate of Analysis

Batch Number	**P2-064**	Manufacture Date	May-2018
Certified	5/11/2018	Expiration Date	May-2019

Procedure	Unit	Lower Limit	Upper Limit	Result
Viscosity (25°C) Procedure: QC-002	cst	2350	2550	2446
Film Thickness vs Target Procedure: QC-003	%	-5.0	+5.0	-3%
Surface Energy (crosslinked) Procedure: QC-006	dynes	26	30	27.5
Appearance: Gardner Color Scale Procedure: QC-009	color unit	n/a	3	Pass
Filtration Level Procedure: QC-006	microns	1.0	1.0	1.0

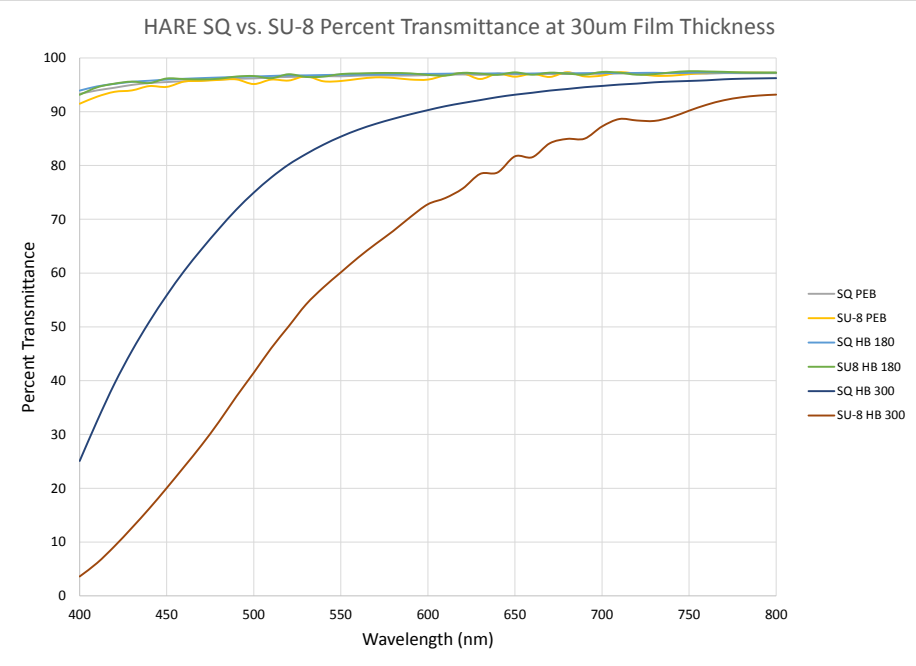
Resin Effects on Transmittance for HARE SQ and SU-8

<u>The transmittance is an indication of contaminants in the resin.</u>

Epoxy films tend to oxidize and turn yellow with increased temperatures experienced during hardbake.

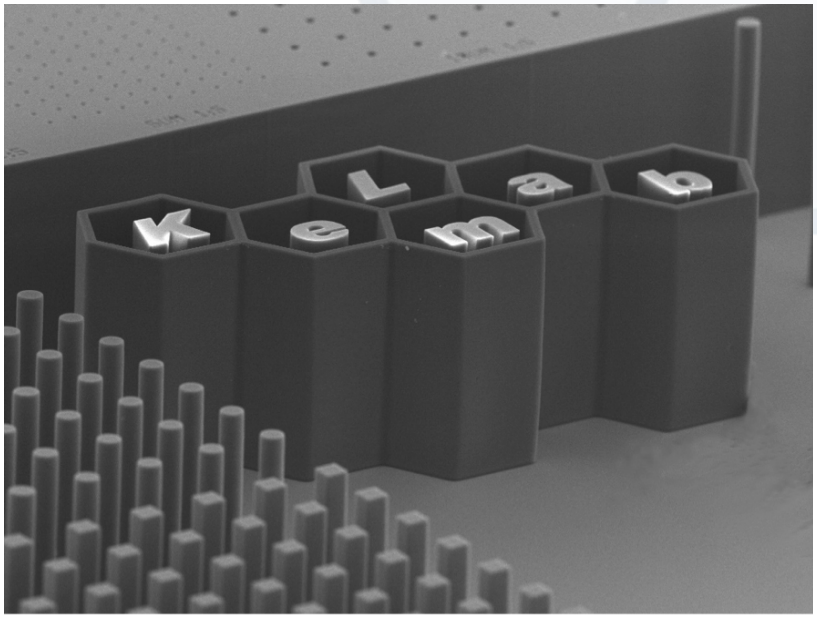
See transmittance data below for both HARE SQ and SU-8.

Compare films: No hard-bake and hard-baked at 180°C & 300°C

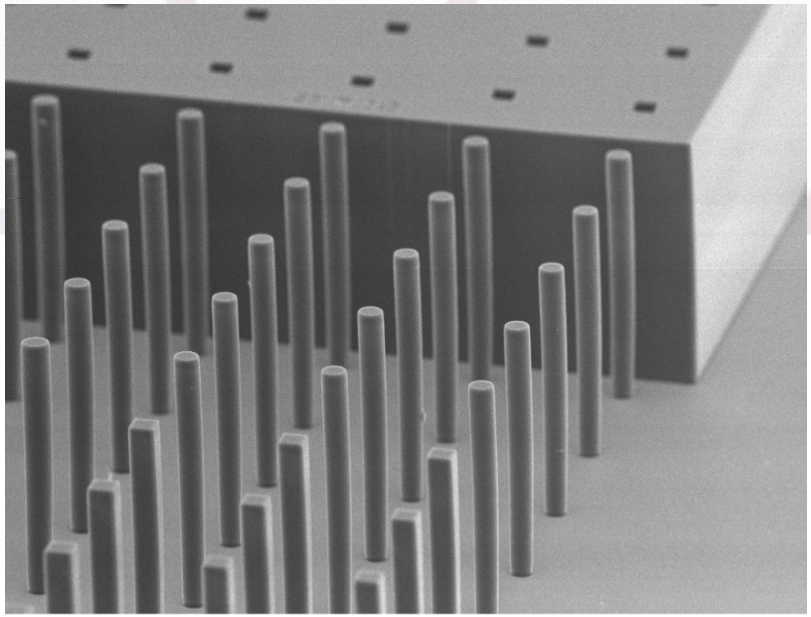


HARE SQ Negative Epoxy Resin

Double Coat for films >100 μm



HARE SQ 50, 70d, 150x, 200 μm FT



HARE SQ 50, 65d, 130x, 200 μm FT

For purchasing or product inquires please contact us:

Website: www.kemlab.com

Email: sales@kemlab.com

Phone: 781-281-0174

Address: 254 W Cummings Park, Woburn MA 01801 USA

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