Process Recommendations
Coating of AZ® BARLi-IIä

Substrate Pre-Treatment:

HMDS not recommended

Spin Process:

Target Thickness: 910 Å for AZ® BARLi II™ 90 (1st minimum)
1970 Å for AZ® BARLi II™ 200 (2nd minimum)

Spin process and EBR process is similar to photoresist coating process:
apply static or dynamic at 500 –1000 rpm
final Spin speed approx. 3000 rpm, actual setting depends on equipment,
set spin speed to meet target thickness as above.
Dispense volume approx. 4 ml for 200 mm wafers

EBR:

AZ® EBR 70/30 recommended for best results; also compatible to EL, or other solvents

Bake:

Recommended setting: 200 °C, 60 seconds on contact hotplate. Depending on equipment, temperature may be set between 180°C to 220°C and proximity bake may be applied

Thickness Measurement:

The Cauchy coefficients for AZ® BARLi II™ coating are: (at standard bake conditions as above):

A = 1.6097
B = 0.0083014
C = 0.006187

These numbers were measured using an ellipsometer in AZ® Electronic Materials laboratory. They fit the following Cauchy equation:

$n = A + B/\lambda 2 + C/\lambda 4$, where B in μm^2, C in μm^4.
(If using nanometers (nm), then multiply B by 10^6, C by 10^{12};
If using Angströms (Å), then multiply B by 10^8, C by 10^{16})

If the unit of Å is used for AZ® BARLi II™ film thickness measurement on a Prometrix™ equipment, the values of the Cauchy coefficients should be:
A = 1.6097
B = 8.3014×10^5 (instead of 0.0083014)
C = 6.187×10^{13} (instead of 0.006187)

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Process Optimization for AZ® BARLi-II Recommended Procedure

1. Generate a BARLi®II spin curve, on bare Si pilots, using spin speeds between 2000 and 6000 rpm. Use the smallest increment possible (500 rpm max.) at the chosen Barli®II bake temperature.

2. Obtain 8 production wafers (at the appropriate BARLi®II pattern step) and 7 bare Si pilots.

3. Pattern 1 production wafer using the standard process but with NO BARLi®II.

4. Refer to the spin curve and find the spin speed which yields an BARLi®II thickness of about 2100 A on bare Si.

5. Coat one bare Si pilot and one production wafer back-to-back at this spin speed. Measure and record the BARLi® II thickness on the bare Si pilot.

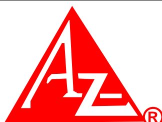
6. Repeat step 5 using three higher and three lower spin speeds such that 7 different BARLi® II thicknesses between 1800A and 2400A are achieved (as measured on the bare SI pilots).

7. Using the same exposure field (or the same die) on all 8 production wafers, perform an intra-field (or intra-die) CD measurement matrix. Sample as many different sites around the die as possible (30 to 40 min.) making sure that all sites are minimum CD for that device.

8. Calculate the mean and 3σ for each wafer to determine which one exhibits the best intra-die (or intra-field)CD uniformity. Plot the resulting data as shown on page 1. The best wafer should show at least a 45 to 55% improvement in uniformity over the wafer patterned with no BARLi® II.

9. Note the spin speed and BARLi® II thickness (from the bare SI pilot) which corresponds to the "best" wafer from step 8.

10. Set the process spin speed accordingly and use the target thickness in routine quals on bare Si pilots, adjusting spin speed as necessary to maintain the optimum BARLi®II thickness.



Process Recommendations
Dry-etch of AZâ BARLi-IIä

Equipment	Gas	Flow rate [sccm]	RF Power [W]	DC bias [V]	CD etch bias
Applied Materials (process a)	CHF_3	5	600	0	< 20 nm[1)]
	C_2F_6	15			
	0_2	30			
Applied Materials (process b)	CHF_3	7	600	0	< 20 nm[1)]
	C_2F_6	20			
	0_2	40			
LAM 4420	HBr	30	300	n.a.	~ 50 nm [1) 2)]
	0_2	20			
Samco Inc.	CHF_3	40	60		n.a. [3)]
	0_2	10			

[1)] Process run by customers

[2)] without Fluorine = no attack on Poly-Si,
small addition of C_2F_6 will diminish etch CD bias to < 30 nm

[3)] Process for cure-temperature dependency of etch rate
(see AZ® BARLi II brochure)

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