Brewer Science® DUV 42S

248-nm Anti-Reflective Coating

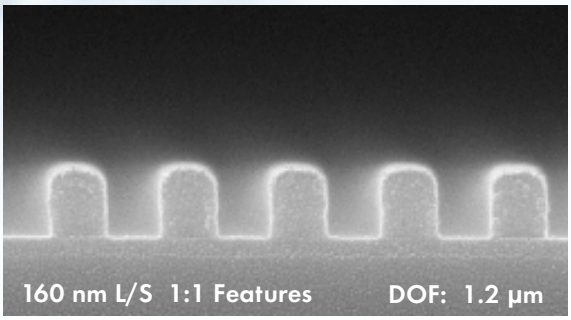
brewer science

DUV 42S coating conserves etch budget and improves throughput in 248-nm lithography for ESCAP resist systems

Benefits

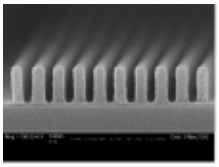
- Conserve etch budget with this conformal BARC that provides fast dry etching
- Increase tool uptime due to ultralow outgassing
- Compatible with ESCAP 248-nm photoresists

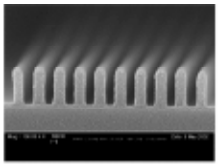
DUV42S with JSR M230Y Resist

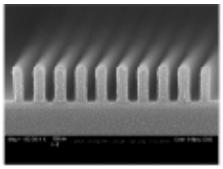


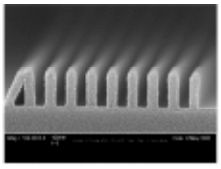
Resist thickness: 400 nm
PAB: 130°C for 90 s
PEB: 130°C for 90 s
BARC bake: 205°C for 60 s
Exposure Dose: 18 mJ/cm$_2$

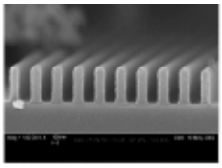
Exposure Latitude of DUV 42S Coatings

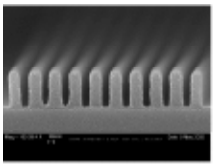

26 mJ/cm²


27 mJ/cm²

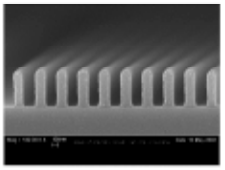

28 mJ/cm²

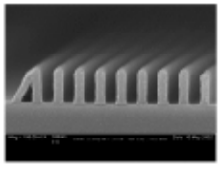

29 mJ/cm²


30 mJ/cm²


25 mJ/cm²

Resolution: 130 nm
Resist: JSR M91Y
Film Thickness = 6100 Å
PAB = 130°C for 90 s
PEB = 120°C for 90 s
Focus = -0.2 µm
Canon EX3
NA = 0.60, σ = 0.65
**Wafers patterned at JSR Corporation™


31 mJ/cm²


32 mJ/cm²

Material Properties

Typical Properties

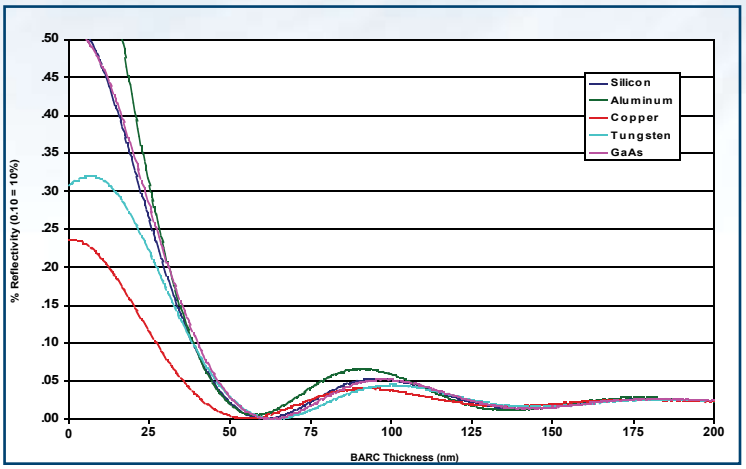
n at 248 nm	1.45
k at 248 nm	0.44
n at 633 nm	1.56
Cauchy A	1.5527
Cauchy B	5.66E-03
Cauchy C	1.24E-03
Ions (Al, Cu, Mg, Mn, K)	< 25 ppb
Ions (Ca, Fe, Na)	< 50 ppb
Shelf Life at 21 °C ± 5 °C	12 months

Product-Specific Properties

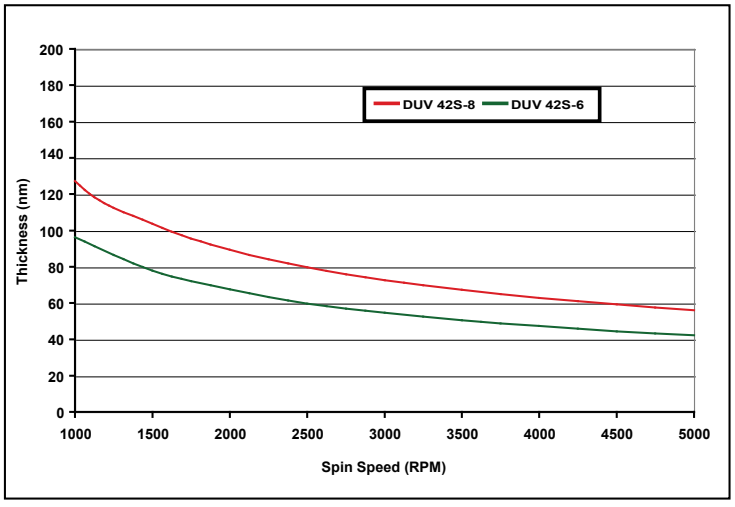
DUV 42S-6 coating:
Thickness at 2500 rpm, 205 °C 600 Å

DUV 42S-8 coating:
Thickness at 2500 rpm, 205 °C 800 Å

Reflectivity Curves on Various Substrates for DUV 42S Coatings



Spin Speed Curves for DUV 42S Coatings



Process Recommendations

Coat

DUV 42S coating is applied by spin coating. Apply with a dynamic dispense* at 1000 to 4000 rpm and immediately ramp (no spread spin) to 2000 to 5000 rpm for 30 seconds.
Use standard edge bead remover (EBR) and backside process at less than 1500 rpm with any standard EBR solvent, such as Brewer Science® Edge Bead Cleaner (EBC) Solvent. An adhesion promoter is not required.
*Dispense speed optimization for specific equipment is required for thickness uniformity and defect reduction.

Bake

Single-stage hot plate bake at 205° ± 20 °C for 60 seconds. Baking temperatures may need to be optimized to achieve the desired photoresist profile. A pre-bake of 90° to 110 °C for 30 seconds will increase the planarization of the BARC.

Resist Coat

Resist can be applied over the BARC without any modification to the standard resist spin-coating or baking process. An adhesion promoter is not required.

Exposure

In most applications, exposure dose may need to be increased from that of stand-alone resist processes by 20% to 50% due to the reduction in reflected light from the substrate.

Resist Develop

Use standard photoresist develop parameters.

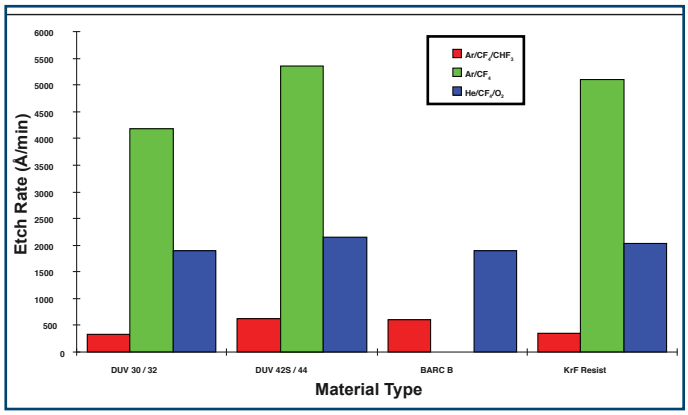
Dry Etch

DUV 42S coating may be dry etched by a number of plasma etching methods in a range of etch gases including O_2, O_2/CHF_3/Ar, C_2F_6, Cl_2, N_2/O_2, O_2/HBr, and HCl.

Stripping

DUV 42S coating can be removed by an oxidizing plasma or an oxidizing solvent stripping process such as ozone plasma stripping, Piranha® cleaning, or RCA cleaning.

Etch Rate Comparison of DUV 42S Coatings



F.6.6.7000, B Effective Date: 3/17/2010