**LIFT-OFF PROCESS**

Lift-Off can be achieved in two possible ways which are described below:

1. Image Reversal, and
2. Bi-Layer Process

Both the Process is discussed in detail as follows.

IMAGE REVERSAL

AZ5214E Positive Photo Resist is used for Image Reversal. This special Photo Resist is intended for Lift-Off techniques which call for a Negative Wall Profile, resulting in a Negative Pattern of the Mask. We use the following Steps for this Process.

**Step 1:** Cleaning of Substrate – Acetone (5 Min) and IPA (5 Min) or Piranha Cleaning [Piranha Clean Recommended]

**Step 2:** Dehydration - 250⁰C for 5 Min

**Step 3:** Spin Coating - AZ5214E @ 4000 RPM for 40 Sec

**Step 4:** Soft Bake/ Pre-Bake - 95⁰C for 2 Min

**Step 5:** EVG Exposure Dosage (With Mask) - 30 mJ / Cm² with Proximity Contact (5 µm)

**Step 6:** Reversal Bake Temperature - 120⁰C

Watch carefully for patterns to emerge on the Substrate. This should happen in between 7 - 95 Sec. Once the pattern is clearly visible, remove immediately from the hotplate. It is important not to Over Bake the Substrate, or no resist will come off on development.

**Step 7:** EVG Flood Exposure Dosage (Without Mask) for Substrate - 110 mJ / Cm²

**Step 8:** Developing - AZ351B: DI Water (1:4) for 20 - 30 Sec

Bi-Layer Process

Using a Lift-Off Resist (LOR 10A) along with the S1813 gives a prominent undercut beneath the resist structure, that aids in effective Lift-Off after Metal Deposition. We use the following Steps for this Process.

**Step 1:** Cleaning of Substrate – Acetone (5 Min) and IPA (5 Min) or Piranha Cleaning [Piranha Clean Recommended]

**Step 2:** Dehydration - 250⁰C for 5 Min.

**Step 3:** Spin Coating - LOR 10A @ 4000 RPM for 40 Sec.

**Step 4:** Soft Bake/ Pre-Bake - 160⁰C for 2 Min.

**Step 5:** Relaxation Time for Curing LOR 10A for 15 Min.

More the Relaxation Time better is the control of the LOR Etch.

**Step 6:** Spin Coating - S1813 @ 4000 RPM for 40 Sec.

**Step 7:** Soft Bake/ Pre-Bake - 95⁰C for 2 Min.

**Step 8:** EVG Exposure Dosage - 40 mJ / Cm² with Proximity Contact (5 µm)

**Step 9:** Developing - AZ351B: DI Water (1:4) for 20 - 30 Sec.

**Step 10:** Post Bake - 95⁰C for 3 Min.

This Post Bake is done to harden S1813 so that no Development happens during the LOR Etch.

**Step 11:** Developing – AZ726 MIF (No Dilution) for 1 Min 15 Sec.

This Developing is carried out to Etch the LOR from the Developed region of S1813 to obtain the desired Undercut for the LOR.

**Step 12:** Deposition of Metal for the desired thickness is carried out.

**Step 13:** Immerse the Metal Deposited Substrate in Remover PG at 60⁰C till the Lift-Off happens.

NOTE: This process was carried out by Pavan and other process such as Etch Rate control of LOR for different temperatures has to be optimized and SEM Image has to be produced.