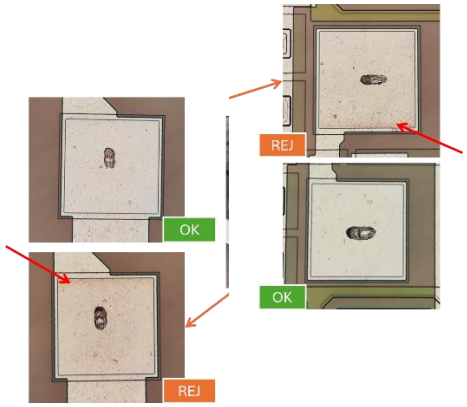
Incoming Defect Details

Discoloration

Defect Mode 1: Discoloration on Bond Pad

Description: Obvious discoloration/rainbow spectrum on the bond pad

Example Image:



Investigation Steps:

1. Pattern: Localized/random
2. Number of the affected wafers.
3. Defect rate.
4. Any coating on the metallization (Siloxane)
5. EDX results (Fluorine/Chlorine/Sulphur/Phosphorus/Silicon/ Carbon/Oxide)

Disposition Guidelines:

EDX result		Defect rate (%)	Pattern	Disposition
Element detected	Percentage (%)			
F	>4%	>50%	Localized	Scrap the affected wafers
			Random	Scrap the affected wafers
		<50%	Localized	Scrap the affected wafers
			Random	Scrap the affected wafers
	≤4%	>50%	Localized	Acceptable. Move as normal.

			Random	Acceptable. Move as normal.
		<50%	Localized	Acceptable. Move as normal.
			Random	-
Cl, S, P	≥1%	>50%	Localized	Scrap the affected wafers
			Random	Scrap the affected wafers
		<50%	Localized	Scrap the affected wafers
			Random	Scrap the affected wafers
Si	≥1%	>50%	Localized	Scrap the affected wafers
			Random	Scrap the affected wafers
		<50%	Localized	Ink off affected quadrant or subject to AOI, whichever more effective.
			Random	Subject to AOI and verify if AOI can capture. If AOI is unable to capture, then scrap the affected wafer.
C, O	Any amount	>50%	Localized	Acceptable. Move as normal.
			Random	Acceptable. Move as normal.
		<50%	Localized	Acceptable. Move as normal.

			Random	**Acceptable. Move as normal.**

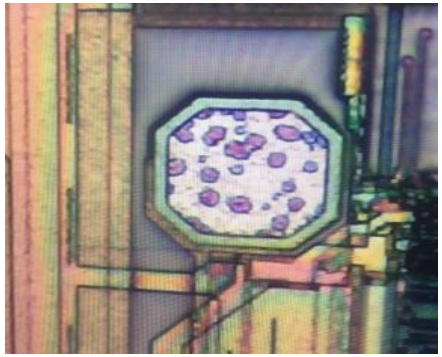
Risk Assessment:

1. Corrosive elements (F/Cl/S/P): Mainly causes corrosion on the metallization or wire bond over the time causing short circuit. Corrosive elements may also propagate from affected region to good region over the time. Therefore, entire wafer must be scraped If corrosive elements are found.
2. Silicon element (Si): Silicon element is usually found in devices with Siloxane coating and are caused by under etch of the Siloxane layer. Silicon on bond pad may disrupt the wire bondability causing NSOP event. Therefore, affected dies are rejected. However, good dies within the same wafer are acceptable.
3. Presence of Fluorine ≤4% is acceptable for ADWL devices. Devices from other fab are subjected to fab's disposition.

Defect Mode 2: Discoloration on Passivation

Description: Obvious discoloration/rainbow spectrum on passivation.

Example Image:



Investigation Steps:

1. Pattern: Localized/random
2. Number of the affected wafers.
3. Defect rate.
4. Feedback to fab.

Disposition Guidelines:

Defect rate (%)	Pattern	Disposition
>50%	**Localized**	**Scrap the affected wafers**
	Random	**Scrap the affected wafers**
<50%	**Localized**	**Ink off affected quadrant**
	Random	**Scrap the affected wafers**

Risk Assessment:

1. Contamination can cause discoloration during processing which can affect the electrical properties of the device.
2. Discoloration may also be caused from the oxidation or corrosion of the underlying material, which could weaken the protective passivation layer and affect the long-term reliability.
3. Uneven passivation layer deposition or variations in thickness can cause discoloration, which indicates inconsistencies in process that might impact the device performance.

Defect Mode 3: Discoloration on Saw Street

Description: Obvious discoloration on saw street

Example Image:

Investigation Steps:

1. Pattern: Localized/random
2. Number of the affected wafers.
3. Defect rate.
4. EDX results (Tungsten Titanium, TiW)

Disposition Guidelines:

EDX result		Defect rate (%)	Pattern	Disposition
Element detected	**Percentage (%)**			
TiW	**Any amount**	**>50%**	**Localized**	**Scrap the affected wafers**
			Random	**Scrap the affected wafers**
		<50%	**Localized**	**Ink off affected quadrant or subject to AOI, whichever more effective.**
			Random	**Scrap the affected wafers**

Risk Assessment:

1. If TiW is detected, the discoloration happened at underneath the layer.

2. TiW is conductive and will impose electrical shorting risk due to unintended electrical paths that are created if it is exposed on the saw street.
3. The exposed TiW can be highly susceptible to corrosion and oxidation after having contact with environmental moisture or contaminants, impacting the long-term reliability of the device.