Process Verification Scheme (25/Sep/2017) 中文版請按此處

A. GENERAL:

a. The aim of this document is to provide users with general guidelines on what processes are allowed to be done on their samples (wafers), according to the process scheme that NFF adopts for contamination control. With the aid of this scheme, users are able to verify the viability of their process flows.

b. In addition to conforming to this scheme, wafers are also required to meet the process requirements of individual equipment/modules.

B. THREE CLEANLINESS LEVELS:

a. All chemicals, materials, samples being processed (referred to as wafers throughout this text) and equipment are grouped according to levels of cleanliness.

b. The cleanliness in NFF, as mentioned in a, is classified by the risk of contamination into 3 levels:

i. **Clean** – this group of wafers and equipment tolerates and poses the least contamination risk.

ii. **Semi-Clean** – this group of wafers and equipment tolerates and poses the risk of being contaminated by the ions of such standard materials or chemicals as

(1) Al,	(2) Mo	(3) Ti,	(4) Cr,	(5) Ni for MILC
(6) ITO,	(7) ZnO	(8) IGZO	(9)MILC wafers	(10) High-quality glass (Corning 1737 or better).

iii. **Non-Standard** – this group of wafers and equipment tolerates and poses the risk of being contaminated by the ions of such non-standard materials and chemicals as

(1) Wafers having undergone lift-off,	(2) Wafers having undergone any processes at/with Non-Standard Equipment,	(3) Low quality glass (including NFF bonding glass),
(4) Fe,	(5) Au,	(6) Pt,
(7) Ag,	(8) KI	(9) KOH,
(10) GaAs/Ga Nitirde,	(11) PCB boards, (photo only)	(12) Cu,
(13) Ni (not for MILC), and	(14) Non-NFF-standard chemicals, such as,	(15) Materials or chemicals not yet classified.

	Polyimide, SU-8, BCB, PDMS, and so on	

C. <u>EVALUATION OF CLEANLINESS OF WAFERS:</u>

i. The **cleanliness of wafer** is graded according to process history. It should be noted that the cleanliness of a wafer is not fixed and it will change as the fabrication proceeds.

ii. **Downward compatible**. The cleanliness of wafers is downward compatible. Only when the cleanliness of wafers is equal to or cleaner than that of machines/equipment, will the processes be allowed. For instance, the clean wafers are accepted by Clean, Semi-Clean and Non-Standard equipment. And, Semi-Clean wafers are accepted by Semi-Clean and Non-Standard equipment. However, after such processes, the status of the wafers having been processed will be degraded.

iii. **Not the reverse**. The cleanliness of wafers is not upward compatible. Once those wafers have been in contact with anything from a less clean group, they will be regarded as having been contaminated by that groups and their status is then downgraded accordingly. That is to say, wafers, once contaminated, are never allowed to go back to the original group.

D. <u>EQUIPMENT FOR MULTIPLE GROUPS:</u>

a. Owing to limitation of resources, some equipment and machines, which are less susceptible to contamination, are assigned to serve multiple groups. Take CF-3000 Implanter for example. It accepts clean and semi-clean wafers.

b. In general, the cleanliness of the wafers remains unaffected after being processed at/with this kind of equipment. However, in the case that the cleanliness levels of wafers are higher than those of the equipment, the status of the wafers are then downgraded according to Rule C.

E. <u>DECONTAMINATION AND ITS REQUIREMENTS:</u>

a. There is one exception to rule C(iii), which is, nevertheless, **not applicable to Non-Standard and most Semi-Clean wafers**.

b. Only the wafers undergone proper Post CMP, can be decontaminated:

c. After decontamination, the cleanliness of the wafers will then become "Clean.", and are allowed to go back to Clean group.

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