Record of Letter Ballot Review by TC Chapter for Procedural Review

Region/Locale: Europe
Global Technical Committee: Compound Semiconductor Materials
TC Chapter Cochairs: Arnd Weber/SiCrystal, Christian Kranert/Fraunhofer IISB
Standards Staff: Kevin Nguyen

	Scheduled in Background Statement	Actual
Date	April 14, 2026	April 14, 2026
Location	OVTCCM	OVTCCM
Reason for Change of Date and/or Location (if changed)		

Note: Refer to *Regulations* ¶ 9.5 Exceptions for allowable reason to change.

I. Document Number and Title

Document Number	Document Title
7111	Revision of SEMI M81-0418, Guide for Defects Found in Monocrystalline Silicon Carbide Substrates

II. Tally

Standards staff to fill in.

Voting Tally: As-cast tally after close of voting period

Note: A minimum of 60% of the Voting Interests that have TC Members within the global technical committee that issued the Letter Ballot must return Votes. (*Regulations* ¶ 9.6.2.1.1)

Note: Refer to *Regulations* § 3.2.1 for definition of Voting Interest.

Voting Interest:	Returned Votes		Distribution		Return Rate	
Letter Ballot	61	÷	101	=	60.40%	≥60%
Intercommittee Ballot	41					
Voting Interest Reject(s)	2		Total Voters with Rejects			2
Voting Interest Accept(s)	61					

III. Rejects

Voting Interest Reject 1 (Voting Interest Name: Shin-Etsu Chemical)

Voter Reject 1 (Voter: Masayoshi Obara and Shin-Etsu Chemical)

Negative 1

Negative	Referenced Section/ Paragraph	*TF/TC Chapter to fill in, including text in the ballot if necessary.		
	Negative Text	*Original complete Negative text (e.g., issue, justification, suggestion) should be copied.		
		Since the method for evaluating displacement has also been updated, wouldn't it be better to take that into account and fundamentally review it once again?		
TF input (optional)				
Withdrawal (check one)		x	No Negative withdrawal made by Voter.	GO TO "Related" subsection
			Withdrawal document received by Standards staff on MM/DD/YYYY.	GO TO "Final" subsection → (A)
Related	Motion and Reason (check one)	x	'Related' is mutually agreed upon. (Needs no motion.)	GO TO "Persuasive" subsection
			Negative is not related. (Needs ≥2/3 votes to pass.)	
			Reason: XXXX	
	Motion by/ 2nd by	Name (Company)/Name (Company)		
	Discussion			
	Result of Vote (check one)	XX Y-XX N; Motion passed/failed.		
			[Negative is not related.] < 2/3	GO TO "Persuasive" subsection
			2/3 ≤ [Negative is not related.]	GO TO "Final" subsection → (B)
Persuasive	Motion and Reason (check one)		Negative is related and persuasive. (Needs >1/3 votes to pass.)	
		x	Negative is related and not persuasive. (Needs ≥2/3 votes to pass.)	
			Reason: There might be concern that M91 (Test Method for Determination of Threading Screw Dislocation Density in 4H-SiC by X-Ray Topography) and M93 (Test Method for Quantifying Basal Plane Dislocation Density in 4H-SiC by X-Ray Diffraction Topography/Imaging) might not be aligned with M81. The task force team is aware of M91 and M93 and ongoing updates and has considered this. In fact figure 22 of this ballot, M81 is copied from M91 and uses the identical information.	
	Motion by/ 2nd by	**By:** Christian Kranert (Fraunhofer) **Second:** Tom Barbieri (Wolfspeed)		
	Discussion			

	Result of Vote (check one)	6-Y 1-N; Motion passed					
			[Negative is related and persuasive.] > 1/3	**Is a technical change recommended? (check one)**		**Y**	**GO TO "Address by Technical Change Option" subsection**
			[Negative is related and not persuasive.] < 2/3			**N**	**GO TO "Final" subsection → (E)**
		x	2/3 ≤ [Negative is related and not persuasive.] < 90%	**GO TO "Final" subsection → (C)**			
			90% ≤ [Negative is related and not persuasive.]	**GO TO "Not Significant Finding Option" subsection**			
Final	**(check if applicable)**		**(A)**	Withdrawn **(counted under h in disposition)**			
			(B)	Not related **(counted under i in disposition)**			
		x	**(C)**	Related and not persuasive (significant)			
			(D)	Not significant **(counted under j in disposition)**			
			(E)	Related and persuasive and not addressed by technical change	**DOCUMENT FAILS**		
			(F)	Addressed by technical change **(counted under k disposition)**			
	(check if applicable)		*Comment generated.* ***Refer to Section V-(ii) Comment #*** *X.*				

Disposition of Voting Interest Reject 1

Check only when the Document has not been failed.

1	Original number (#) of Negatives			**(g)**
#	Number of Negatives withdrawn			**(h)**
#	Number of Negatives found not related			**(i)**
#	Number of Negatives found not significant			**(j)**
#	Number of Negatives addressed by technical change **(Negative becomes not significant)**			**(k)**
Final			**g** - (**h** + **i** +**j** + **k**) = 0	**Reject is Not Valid and is not included in the denominator of § VI.** ***Approval Conditions Check***
		x	**g** - (**h** + **i** +**j** + **k**) >0	**Reject is included in the denominator of § VI.** ***Approval Conditions Check***
			Reject without a Negative	**Not Valid**

Note: If all of the Negatives included with a Reject Vote are withdrawn, determined to be not related, or determined to be not significant, the Reject Vote is not valid. (*Regulations* ¶ 9.4.3.3)
Note: A Negative addressed by a technical change is automatically considered to be not significant. (*Regulations* ¶ 9.6.1.4.5.2)

Voting Interest Reject 2 (Voting Interest Name: **Kitabatake Kitabatake**)

Voter Reject 1 (Voter: **Makoto Kitabatake and Kitabatake Kitabatake**)

Negative 1

Negative	**Referenced Section/ Paragraph**	***TF/TC Chapter to fill in, including text in the ballot if necessary.**			
	Negative Text	***Original complete Negative text (e.g., issue, justification, suggestion) should be copied.**			
		7111 seems like the copies of Defect information without clear explanations and definitions. On Table 1. List of Defects shows too-much mixture of types (easy-to-be-observed bulk, mechanical polished surface, crystalline, and even etch pits) and in materials (4H/6H, n-type/semi-insulating, off-axis/?). I recommend to reconsider followings, even if the sentences described in 3. Limitations exist.			
TF input (optional)					
Withdrawal (check one)		x	No Negative withdrawal made by Voter.		**GO TO "Related" subsection**
			Withdrawal document received by Standards staff on MM/DD/YYYY.		**GO TO "Final" subsection → (A)**
Related	**Motion and Reason (check one)**	x	'Related' is mutually agreed upon. **(Needs no motion.)**		**GO TO "Persuasive" subsection**
			Negative is not related. **(Needs ≥2/3 votes to pass.)**		
			Reason	XXXX	
	Motion by/ 2nd by	Name (Company)/Name (Company)			
	Discussion				
	Result of Vote (check one)	XX **Y**-XX **N**; Motion passed/failed.			
			[Negative is not related.] < 2/3		**GO TO "Persuasive" subsection**
			2/3 ≤ [Negative is not related.]		**GO TO "Final" subsection → (B)**
Persuasive	**Motion and Reason (check one)**		Negative is related and persuasive. **(Needs >1/3 votes to pass.)**		
		x	Negative is related and not persuasive. **(Needs ≥2/3 votes to pass.)**		
			Reason	This is the scope of M81 to explain defects by an easy to use catalog of examples as a guideline. It is not the idea to present a full featured discussion of physical methods and advantages and disadvantages.	
	Motion by/ 2nd by	**By: Christian Kranert (Fraunhofer) Second: Shailaja Rao (Wolfspeed)**			
	Discussion				
		3-Y 0-N; Motion passed			

	Result of Vote (check one)		[Negative is related and persuasive.] > 1/3	**Is a technical change recommended?** (check one)		**Y**	**GO TO "Address by Technical Change Option" subsection**
			[Negative is related and not persuasive.] < 2/3			**N**	**GO TO "Final" subsection → (E)**
		x	2/3 ≤ [Negative is related and not persuasive.] < 90%	**GO TO "Final" subsection → (C)**			
			90% ≤ [Negative is related and not persuasive.]	**GO TO "Not Significant Finding Option" subsection**			
Final	**(check if applicable)**		**(A)**	Withdrawn **(counted under h in disposition)**			
			(B)	Not related **(counted under i in disposition)**			
		x	**(C)**	Related and not persuasive (significant)			
			(D)	Not significant **(counted under j in disposition)**			
			(E)	Related and persuasive and not addressed by technical change	**DOCUMENT FAILS**		
			(F)	Addressed by technical change **(counted under k disposition)**			
	(check if applicable)		*Comment generated.* ***Refer to Section V-(ii) Comment #*** *X.*				

Negative 2

Negative	**Referenced Section/ Paragraph**	***TF/TC Chapter to fill in, including text in the ballot if necessary.**		
	Negative Text	***Original complete Negative text (e.g., issue, justification, suggestion) should be copied.**		
		Followings are examples of **Negative** points. Please refine the other part too. (Overall examples) ● In all Defect/Keyword, the types (easy-to-be-observed bulk, mechanical polished surface, crystalline, and even etch pits) should be clearly distinguished and some names should be redefined and reconsidered. In all figures, the detailed explanation about materials (4H/6H, n-type/semi-insulating (doping density?), off-axis/?) should be attached.		
TF input (optional)				
Withdrawal (check one)		x	No Negative withdrawal made by Voter.	**GO TO "Related" subsection**
			Withdrawal document received by Standards staff on MM/DD/YYYY.	**GO TO "Final" subsection → (A)**
Related	**Motion and Reason** (check one)	x	'Related' is mutually agreed upon. **(Needs no motion.)**	**GO TO "Persuasive" subsection**
			Negative is not related. **(Needs ≥2/3 votes to pass.)**	
			Reason	XXXX
	Motion by/ 2nd by	Name (Company)/Name (Company)		
	Discussion			
		XX **Y**-XX **N**; Motion passed/failed.		

	Result of Vote (check one)		[Negative is not related.] < 2/3				**GO TO "Persuasive" subsection**
			2/3 ≤ [Negative is not related.]				**GO TO "Final" subsection → (B)**
Persuasive	**Motion and Reason** (check one)		Negative is related and persuasive. **(Needs >1/3 votes to pass.)**				
		x	Negative is related and not persuasive. **(Needs ≥2/3 votes to pass.)**				
			Reason	Unclear, which names should be considered Material parameters are given as far as available.			
	Motion by/ 2nd by	**By: Christian Kranert (Fraunhofer)** **Second: Shailaja Rao (Wolfspeed)**					
	Discussion						
	Result of Vote (check one)	3-Y 0-N; Motion passed					
			[Negative is related and persuasive.] > 1/3	**Is a technical change recommended?** (check one)		**Y**	**GO TO "Address by Technical Change Option" subsection**
			[Negative is related and not persuasive.] < 2/3			**N**	**GO TO "Final" subsection → (E)**
		x	2/3 ≤ [Negative is related and not persuasive.] < 90%	**GO TO "Final" subsection → (C)**			
			90% ≤ [Negative is related and not persuasive.]	**GO TO "Not Significant Finding Option" subsection**			
Final	(check if applicable)		**(A)**	Withdrawn **(counted under h in disposition)**			
			(B)	Not related **(counted under i in disposition)**			
		x	**(C)**	Related and not persuasive (significant)			
			(D)	Not significant **(counted under j in disposition)**			
			(E)	Related and persuasive and not addressed by technical change			**DOCUMENT FAILS**
			(F)	Addressed by technical change **(counted under k disposition)**			
	(check if applicable)		*Comment generated.* ***Refer to Section V-(ii) Comment #*** *X.*				

Negative 3

Negative	**Referenced Section/ Paragraph**	***TF/TC Chapter to fill in, including text in the ballot if necessary.**	
	Negative Text	***Original complete Negative text (e.g., issue, justification, suggestion) should be copied.**	
		The same position data set of all of (microscope, XRT, SXRT, and Crossed polarizer apparatus, PL?, else, and also etch-pits) should be shown as the Guide standard.	
TF input (optional)			
Withdrawal (check one)		x	No Negative withdrawal made by Voter. **GO TO "Related" subsection**

			Withdrawal document received by Standards staff on MM/DD/YYYY.			GO TO "Final" subsection → (A)
Related	Motion and Reason (check one)	x	'Related' is mutually agreed upon. (Needs no motion.)			GO TO "Persuasive" subsection
			Negative is not related. (Needs ≥2/3 votes to pass.)			
			Reason	XXXX		
	Motion by/ 2nd by	Name (Company)/Name (Company)				
	Discussion					
	Result of Vote (check one)	XX Y-XX N; Motion passed/failed.				
			[Negative is not related.] < 2/3			GO TO "Persuasive" subsection
			2/3 ≤ [Negative is not related.]			GO TO "Final" subsection → (B)
Persuasive	Motion and Reason (check one)		Negative is related and persuasive. (Needs >1/3 votes to pass.)			
		x	Negative is related and not persuasive. (Needs ≥2/3 votes to pass.)			
			Reason	Systematic description of any defect with all available methods is desirable from scientific point of view, however is far beyond the possibilities of this volunteer activity.		
	Motion by/ 2nd by	By: Christian Kranert (Fraunhofer) Second: Shailaja Rao (Wolfspeed)				
	Discussion					
	Result of Vote (check one)	3-Y 0-N; Motion passed				
			[Negative is related and persuasive.] > 1/3	Is a technical change recommended? (check one)		Y: GO TO "Address by Technical Change Option" subsection
			[Negative is related and not persuasive.] < 2/3			N: GO TO "Final" subsection → (E)
		x	2/3 ≤ [Negative is related and not persuasive.] < 90%	GO TO "Final" subsection → (C)		
			90% ≤ [Negative is related and not persuasive.]	GO TO "Not Significant Finding Option" subsection		
Final	(check if applicable)		(A)	Withdrawn (counted under h in disposition)		
			(B)	Not related (counted under i in disposition)		
		x	(C)	Related and not persuasive (significant)		
			(D)	Not significant (counted under j in disposition)		
			(E)	Related and persuasive and not addressed by technical change		DOCUMENT FAILS
			(F)	Addressed by technical change (counted under k disposition)		
	(check if applicable)		*Comment generated. Refer to Section V-(ii) Comment # X.*			

Negative 4

Negative	**Referenced Section/ Paragraph**	*TF/TC Chapter to fill in, including text in the ballot if necessary.					
	Negative Text	*Original complete Negative text (e.g., issue, justification, suggestion) should be copied.					
		The name Planar Defect is hard to recognize as the consistent distinguishable Defects name. The names; Structural Imperfection (Fig.5), Crystallite Defect (Fig.6), FPD (Fig.17), and Slip Lines (Fig.18) in figure captions are also hard to recognize as the consistent distinguishable Defects name without detailed explanations.					
TF input (optional)							
Withdrawal (check one)		x	No Negative withdrawal made by Voter.				GO TO "Related" subsection
			Withdrawal document received by Standards staff on MM/DD/YYYY.				GO TO "Final" subsection → (A)
Related	**Motion and Reason (check one)**	x	'Related' is mutually agreed upon. (Needs no motion.)				GO TO "Persuasive" subsection
			Negative is not related. (Needs ≥2/3 votes to pass.)				
			Reason	XXXX			
	Motion by/ 2nd by	Name (Company)/Name (Company)					
	Discussion						
	Result of Vote (check one)	XX **Y**-XX **N**; Motion passed/failed.					
			[Negative is not related.] < 2/3				GO TO "Persuasive" subsection
			2/3 ≤ [Negative is not related.]				GO TO "Final" subsection → (B)
Persuasive	**Motion and Reason (check one)**		Negative is related and persuasive. (Needs >1/3 votes to pass.)				
		x	Negative is related and not persuasive. (Needs ≥2/3 votes to pass.)				
			Reason	Defect abbreviations are defined in section 4. Several definitions are in M55 (referenced).			
	Motion by/ 2nd by	**By: Christian Kranert (Fraunhofer)** **Second: Shailaja Rao (Wolfspeed)**					
	Discussion						
	Result of Vote (check one)	3-Y 0-N; Motion passed					
			[Negative is related and persuasive.] > 1/3	**Is a technical change recommended? (check one)**		Y	GO TO "Address by Technical Change Option" subsection
			[Negative is related and not persuasive.] < 2/3			N	GO TO "Final" subsection → (E)
		x	2/3 ≤ [Negative is related and not persuasive.] < 90%	GO TO "Final" subsection → (C)			

			90% ≤ [Negative is related and not persuasive.]	GO TO "Not Significant Finding Option" subsection	
Final	(check if applicable)		(A)	Withdrawn (counted under h in disposition)	
			(B)	Not related (counted under i in disposition)	
		x	(C)	Related and not persuasive (significant)	
			(D)	Not significant (counted under j in disposition)	
			(E)	Related and persuasive and not addressed by technical change	DOCUMENT FAILS
			(F)	Addressed by technical change (counted under k disposition)	
	(check if applicable)		*Comment generated. Refer to Section V-(ii) Comment # X.*		

Negative 5

Negative	Referenced Section/ Paragraph	*TF/TC Chapter to fill in, including text in the ballot if necessary.		
	Negative Text	*Original complete Negative text (e.g., issue, justification, suggestion) should be copied.		
		Detailed examples ● Micropipe (easy-to-be-observed **bulk**) Figure 1; Explanation is not enough. Are the short 2 lines (-100um) Micropipes? Figure 3; How different depth of focus in two photos? Please explain consistent structure of Micropipe in Figure 1 and 3 (related to Planar Defect). Figure 6; consistency needed. Just want to say? "Crossed Polarizer Image shows Crystallite Defects (how to distinguish?) and Micropipes". What are green circles? Figure 21, 22, 23; consistency needed related to above Figures 1, 3, 6. ● Planar defect (easy-to-be-observed **bulk**) Figure 3; The defect exhibits different size and structure in comparison with those in Fig.2. Clear explanation is needed on structural relationship of the Planar Defect to Micropipe. ● Crystallite Figure 6 shows just wafer size Crossed-polarizer (no-enlarged) image without explanation of the structure. It is inadequate for the Guide. Please clearly explain what is the difference between Crystallite Defects and Planar defect (in Fig. 2 and 3).		
TF input (optional)				
Withdrawal (check one)		x	No Negative withdrawal made by Voter.	GO TO "Related" subsection
			Withdrawal document received by Standards staff on MM/DD/YYYY.	GO TO "Final" subsection → (A)
Related	Motion and Reason (check one)	x	'Related' is mutually agreed upon. (Needs no motion.)	GO TO "Persuasive" subsection
			Negative is not related. (Needs ≥2/3 votes to pass.)	
			Reason	XXXX
	Motion by/ 2nd by	Name (Company)/Name (Company)		

	Discussion						
	Result of Vote (check one)	XX **Y**-XX **N**; Motion passed/failed.					
			[Negative is not related.] < 2/3				**GO TO "Persuasive" subsection**
			2/3 ≤ [Negative is not related.]				**GO TO "Final" subsection → (B)**
Persuasive	**Motion and Reason** (check one)		Negative is related and persuasive. **(Needs >1/3 votes to pass.)**				
		x	Negative is related and not persuasive. **(Needs ≥2/3 votes to pass.)**				
			Reason	Planar defects can have different sizes: Fig 2 shows large examples easy visible wo naked eye, fig 3 shows microscopic example. Kibatake-san's comments are highly appreciated and will be reconsidered at next update.			
	Motion by/ 2nd by	**By: Christian Kranert (Fraunhofer)** **Second: Shailaja Rao (Wolfspeed)**					
	Discussion						
	Result of Vote (check one)	3-Y 0-N; Motion passed					
			[Negative is related and persuasive.] > 1/3	**Is a technical change recommended?** (check one)		**Y**	**GO TO "Address by Technical Change Option" subsection**
			[Negative is related and not persuasive.] < 2/3			**N**	**GO TO "Final" subsection → (E)**
		x	2/3 ≤ [Negative is related and not persuasive.] < 90%	**GO TO "Final" subsection → (C)**			
			90% ≤ [Negative is related and not persuasive.]	**GO TO "Not Significant Finding Option" subsection**			
Final	**(check if applicable)**		**(A)**	Withdrawn **(counted under h in disposition)**			
			(B)	Not related **(counted under i in disposition)**			
		x	**(C)**	Related and not persuasive (significant)			
			(D)	Not significant **(counted under j in disposition)**			
			(E)	Related and persuasive and not addressed by technical change			**DOCUMENT FAILS**
			(F)	Addressed by technical change **(counted under k disposition)**			
	(check if applicable)		*Comment generated.* ***Refer to Section V-(ii) Comment #*** *X.*				

Disposition of Voting Interest Reject 2

Check only when the Document has not been failed.

5	Original number (#) of Negatives		**(g)**
#	Number of Negatives withdrawn		**(h)**
#	Number of Negatives found not related		**(i)**
#	Number of Negatives found not significant		**(j)**
#	Number of Negatives addressed by technical change **(Negative becomes not significant)**		**(k)**
Final		**g** - (**h** + **i** +**j** + **k**) = 0	**Reject is Not Valid and is not included in the denominator of § VI. *Approval Conditions Check***
	x	**g** - (**h** + **i** +**j** + **k**) >0	**Reject is included in the denominator of § VI. *Approval Conditions Check***
		Reject without a Negative	**Not Valid**

Note: If all of the Negatives included with a Reject Vote are withdrawn, determined to be not related, or determined to be not significant, the Reject Vote is not valid. (*Regulations* ¶ 9.4.3.3)
Note: A Negative addressed by a technical change is automatically considered to be not significant. (*Regulations* ¶ 9.6.1.4.5.2)

IV. Other Technical Issues

Note: TC Chapter may choose to address a technical issue that is not part of a Negative received on a Letter Ballot (i.e., a Comment or a reason not addressed by a Vote response) by handling it as a Negative and finding it related and technically persuasive. The TC Chapter may then fail the Document or address such technical issue by using the procedure defined in *Regulations* § 9.6.1.4.3 to make a technical change to the Document. (*Regulations* ¶ 9.6.1.4.2.5)

None

V. Comments

V- (i) Voters' Comments

Commenter 1 (Keiji Toda/ SiC alliance) - Comment 1

Comment	***TF/TC Chapter to fill in section/paragraph #, if necessary.**	
	I think that the classification of defects should be clarified by referring to the IEC standard, and examples of observed defects should be organized and displayed.	
Action	**The TC Chapter agreed to do one of the following actions.**	
	***No motion is required in this step.**	
		Already addressed by Commenter #, Comment #

	x	No further action was taken by the TC Chapter. [TF response: Unclear which IEC standard is referenced. There is no IEC standard on SiC substrates]
		Refer to the TF for more consideration.
		New Business
		Editorial Change

Commenter 2 (Akihiro Matsuse/ Resonac) - Comment 1

Comment		***TF/TC Chapter to fill in section/paragraph #, if necessary.**
		We suggest rearranging the order of the figures in the figure column of Table 1 so that the figure numbers appear in descending order, which would be helpful for users of this standard.
Action		**The TC Chapter agreed to do one of the following actions.**
		***No motion is required in this step.**
		Already addressed by Commenter #, Comment #
	x	No further action was taken by the TC Chapter. [TF response: This was the target. Due to many figures with more than one defect type, it was not possible to preserve the order of defects of Table 1 for the figures.]
		Refer to the TF for more consideration.
		New Business
		Editorial Change

Commenter 3 (Toshiaki Iwamatsu/Mitsubishi Electric) - Comment 1

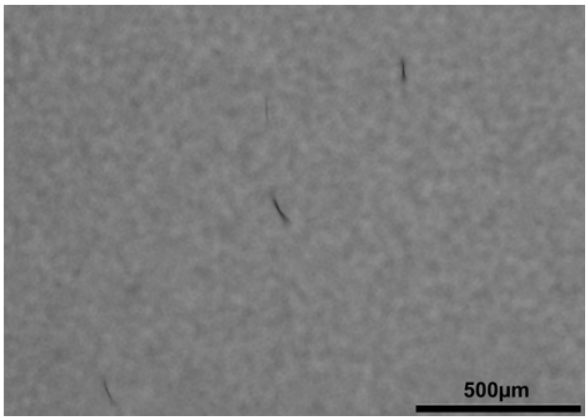
Comment			***TF/TC Chapter to fill in section/paragraph #, if necessary.**
			The defect classification appears to be a mixture of appearance shape and crystallographic classification. For example, pit may appear on the wafer surface of TED or TSD, or may be caused by process damage during wafer manufacturing. TED or TSD, and pit are listed separately in the table. Fig.1 : It is unclear which defect is being pointed to. Adding an arrow would be helpful. Fig.2 : Planar defects in SiC mainly appear as stacking faults and twins. It would be better to add an explanation of them. Fig.3 : The explanation of the observation method for each of the two photographs is insufficient.
Action			**The TC Chapter agreed to do one of the following actions.**
			***No motion is required in this step.**
			Already addressed by Commenter #, Comment #
			No further action was taken by the TC Chapter.
			Refer to the TF for more consideration.
			New Business
	x		Editorial Change
	Options for editorial		**Case 1: No vote in this section:**
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V.*

	change (check one)	x	**Case 2: Voted in this section:** **Original section number and at least one full sentence are required in "FROM" and "TO" fields.**

Editorial Changes

1

FROM:

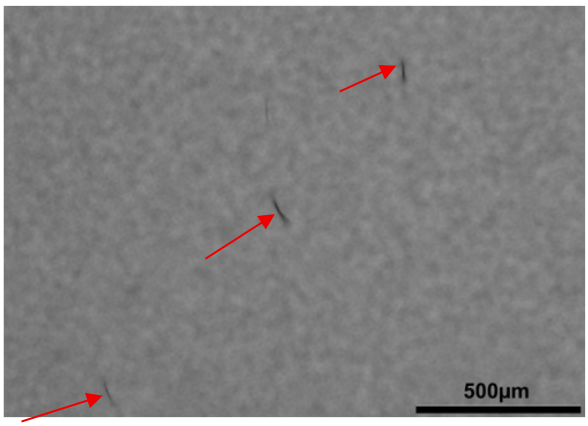


#1 Material: 4H, 4 deg off, Si-face

#2 Inspection Method: Optical Microscope, Transmission Mode, Focus in Bulk

Figure 1
Micropipes

TO:



#1 Material: 4H, 4 deg off, Si-face

#2 Inspection Method: Optical Microscope, Transmission Mode, Focus in Bulk

Figure 1
Micropipes

Justification (If necessary)
Add arrows to identify the Micropipe

Motion	To approve above editorial change(s)
Motion by/2nd by	**By:** Christian Kranert (Fraunhofer) **Second:** Tamzin Lafford (Bruker Corporation)
Discussion	XXXX
Vote	*5-Y 0-N; Motion passed.*

Commenter 4 (Shota Fujiki/ Lasertec) - Comment 1

Comment	*TF/TC Chapter to fill in section/paragraph #, if necessary.	
	Figure 1 appears to be provided as a Micropipe image, and the string-like contrast observed in the image is presumably intended to represent a micropipe. However, based solely on this appearance, it is not possible to conclusively identify the feature as a micropipe. For example, particles or other types of defects could also be expected to exhibit a similar contrast in microscope images. Regarding Figure 3, titled _“Planar Defect with Micropipe Attached on Top Left”_, it is unclear whether the string-like feature at the top left is intended to indicate the through-going pipe portion of a micropipe, and whether the hexagonal feature is being classified as the same type of planar defect shown in Figure 2. If the classification is based on the hexagonal shape, the feature identified as a planar defect in Figure 3 may instead correspond to a type commonly referred to as a carbon inclusion, while the string-like feature at the top left could potentially be contamination or debris associated with the inclusion. Alternatively, it is also possible that the observed structure represents a through micropipe with a hexagonal opening. Based solely on the provided image, the rationale for the defect type classification is not sufficiently clear. Section 9.2 states that the interpretation of etch pits generally depends on orientation, polytype, conductivity type, and doping level, this information is not consistently or fully provided in the captions of the subsequent images. In addition, the doping level appears to be represented by resistivity values in some cases. The description method should be clarified and made consistent, and the relevant parameters should be explicitly specified for each image. Figure 12, it is unclear which defect images correspond to labels 1 through 4. Figure 15, two circled defects are indicated as BPDs. However, the morphological characteristics of these two defects are significantly different, and the basis for classifying both as the same defect type is unclear. Across the figures, the information provided in the figure descriptions and captions is inconsistent; in some cases, parameters such as polytype, offaxis angle, and n-type specification are provided, while in others they are omitted. The standard appears to include a mixture of 4H, 6H, n-type, and semi-insulating materials, even though defect appearances can differ significantly depending on these conditions. These parameters should be clearly and consistently specified to avoid ambiguity in defect interpretation. Across the figures, the descriptions of the inspection method are inconsistent. In some figure captions, the inspection method is specified as “optical microscope, reflection mode (or transmission mode),” while in others this information is omitted.	
Action	**The TC Chapter agreed to do one of the following actions.**	
	*No motion is required in this step.	
		Already addressed by Commenter #, Comment #
	x	No further action was taken by the TC Chapter. [TF response: Very detailed expert comment is highly appreciated and will be reconsidered at next update.]
		Refer to the TF for more consideration.
		New Business
		Editorial Change

Commenter 5 (Junji Senzaki/ AIST) - Comment 1

Comment	*TF/TC Chapter to fill in section/paragraph #, if necessary.	
	Images of each defect in the document should be exemplified in the order in which the defects are listed in Table 1.	
Action	**The TC Chapter agreed to do one of the following actions.**	
	*No motion is required in this step.	
		Already addressed by Commenter #, Comment #
	x	No further action was taken by the TC Chapter. [TF response: This was the target. Due to many figures with more than one defect type, it was not possible to preserve the order of defects of Table 1 in all the figures.]
		Refer to the TF for more consideration.

Commenter 6 (Caroline Chèze/ Scientific Visual SA) - Comment 1

Comment

*TF/TC Chapter to fill in section/paragraph #, if necessary.

I would only modify the caption in figures 23 Right to mention the inspection method (optical microscopy) at first.

Action

The TC Chapter agreed to do one of the following actions.

*No motion is required in this step.

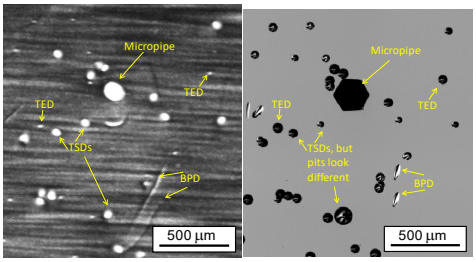
	Already addressed by Commenter #, Comment #
	No further action was taken by the TC Chapter.
	Refer to the TF for more consideration.
	New Business
x	Editorial Change

	Options for editorial change (check one)		**Case 1: No vote in this section:**
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V.*
		x	**Case 2: Voted in this section:**
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

Editorial Changes

1

FROM:

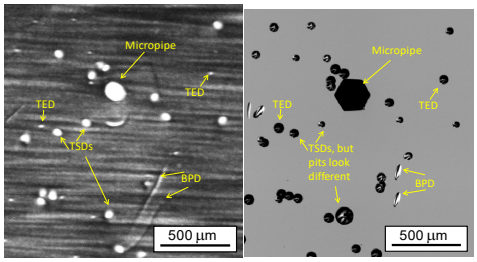


#1 Inspection Methods: Left: Monochromatic X-ray topograph, reflection geometry (1 1 -2 8), SXRT beamline 1-BM, Advanced Photon Source (APS)
Right: Silicon face features after molten KOH etch (Confocal optical image)

#2 Material: 4H-SiC, n-type, 4º off axis, Si-face polished

#3 Note: Published also in [1]

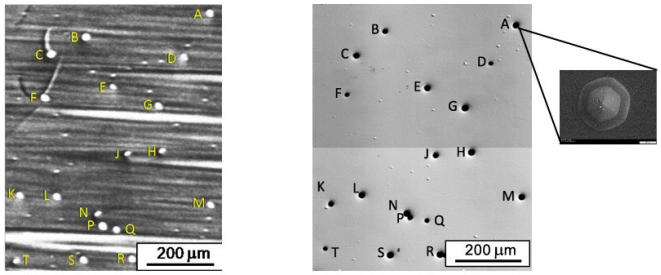
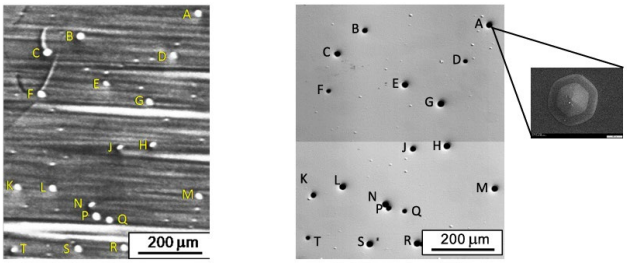
Figure 23
Same Region of Wafer Characterized to Identify Correlation of Different Defects

		TO:  #1 Inspection Methods: Left: Monochromatic X-ray topograph, reflection geometry (1 1 -2 8), SXRT beamline 1-BM, Advanced Photon Source (APS) Right: Confocal optical image Silicon face features after molten KOH etch #2 Material: 4H-SiC, n-type, 4º off axis, Si-face polished #3 Note: Published also in [1] **Figure 23** **Same Region of Wafer Characterized to Identify Correlation of Different Defects**
		Justification (If necessary) Rearranging figure caption.

Motion	To approve above editorial change(s)
Motion by/2nd by	**By:** Christian Kranert (Fraunhofer) **Second:** Caroline Chèze (Scientific Visual SA)
Discussion	XXXX
Vote	*6-Y 0-N; Motion passed.*

Commenter 6 (Caroline Chèze/ Scientific Visual SA) - Comment 2

Comment			***TF/TC Chapter to fill in section/paragraph #, if necessary.**
			I would only modify the caption in figure 24 Right to mention the inspection method (optical microscopy) at first.
Action			**The TC Chapter agreed to do one of the following actions.**
			***No motion is required in this step.**
			Already addressed by Commenter #, Comment #
			No further action was taken by the TC Chapter.
			Refer to the TF for more consideration.
			New Business
	x		Editorial Change
	Options for editorial change **(check one)**		**Case 1: No vote in this section:**
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V.*
		x	**Case 2: Voted in this section:**
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

Editorial Changes	1	**FROM:**  #1 Inspection Methods: Left: Monochromatic X-ray topograph, reflection geometry, (1 1 -2 8), SXRT beamline 1-BM, Advanced Photon Source (APS) Right: Carbon face features after molten KOH etch (Confocal optical image). Close-up shows details of hillock #2 The small features are artifacts #3 Material: 4H-SiC, n-type, 4º off axis, C-face polished #4 Published also in [1] **Figure 24** **Same Region of Wafer Characterized to Identify Correlation of Different Defects (Letters Indicate TSDs)**
		TO:  #1 Inspection Methods: Left: Monochromatic X-ray topograph, reflection geometry, (1 1 -2 8), SXRT beamline 1-BM, Advanced Photon Source (APS) Right: Confocal optical image: Carbon face features after molten KOH etch. Close-up shows details of hillock #2 The small features are artifacts #3 Material: 4H-SiC, n-type, 4º off axis, C-face polished #4 Published also in [1] **Figure 24** **Same Region of Wafer Characterized to Identify Correlation of Different Defects (Letters Indicate TSDs)**
		Justification (If necessary) Rearranging figure caption.

Motion	To approve above editorial change(s)
Motion by/2nd by	**By:** Christian Kranert (Fraunhofer) **Second:** Caroline Chèze (Scientific Visual SA)
Discussion	XXXX
Vote	*6-Y 0-N; Motion passed.*

V-(ii) Comments Created by Handling Negative

None

VI. Editorial Changes Other than Those Voted on in § V

Original section/paragraph number and at least one full sentence are required in "FROM" and "TO" fields.

None

VII. Approval Conditions Check

VII. - (i). Approval Rate

APPROVAL CONDITION 1: All Negatives have been discussed and were withdrawn, found not related, found not persuasive, or addressed by a technical change. (*Regulations* ¶ 9.6.2.1.2)

APPROVAL CONDITION 2: At least 90% of the sum of valid Voting Interest Accept and Voting Interest Reject Votes must be Accept. (*Regulations* ¶ 9.6.2.1.3)

Note: If both approval conditions are not satisfied, the Document fails.

		Accepts		(Accepts + Valid Rejects)				
Approval Rate	=	61		63	=	97%		≥90%

VII. – (ii) Approval Level (check one)

Note: Refer to *Regulations* § 9.6.2 for further information.

x	**Globally Approved (No Ratification Ballot needed):** **The Letter Ballot meets the Letter Ballot approval conditions for the global technical committee.**
	Need a Ratification Ballot: **The Letter Ballot meets the Letter Ballot approval conditions for the TC Chapter and a Ratification Ballot will be issued to validate technical changes.**

VIII. Safety Check

Note: Refer to *Regulations* § 15 for further information.

Motion		
	x	**This is not a Safety Document**, when all safety-related information is removed, the Document is still technically sound and complete. (*Regulations* ¶ 8.7.1)
		This is a Safety Document, when all safety-related information is removed, the Document is not technically sound and complete. (*Regulations* ¶ 8.7.2)
		Safety Checklist (*Regulations* ¶ 15.3) is complete and has been included with the Document throughout the balloting process. (*Regulations* ¶ 15.1.2)
Motion by/2nd by		**By: Christian Kranert (Fraunhofer)** **Second: Tamzin Lafford (Bruker Corporation)**
Discussion		XXXX
Vote		6-Y 0-N; Motion passed

IX. Intellectual Property (IP) Check

Note: This Letter Ballot may cover all or part of a Standard or Safety Guideline. Regardless of the coverage, this IP check applies to the entire Standard or Safety Guideline*. Refer to *Regulations* § 16 for further information.

<table>
<tr><td>x</td><td colspan="5">The TC Chapter meeting chair asked those participating, if they were aware of any patented technology that might be relevant (refer to Regulations ¶ 16.3.1.1) to the Standard or Safety Guideline; or, any copyrighted items or trademarks that are used/reproduced (refer to Regulations ¶ 16.4.1.2) in the Standard or Safety Guideline. (Also refer to Regulations § 8.8)</td></tr>
<tr><td rowspan="3"></td><td>x</td><td>The question is NOT answered in affirmative (No potentially material patented technology or use/reproduction of copyrighted items/trademarks is known.)</td><td colspan="3">GO TO SECTION X.</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">The question is answered in affirmative</td><td rowspan="2">Is any of the known IPs a patented technology?</td><td></td><td>Yes, at least one of them is a patented technology</td><td>GO TO IX (a) “Patented Technology” subsection</td></tr>
<tr><td></td><td>No</td><td>GO TO IX (b) “Copyright items” subsection</td></tr>
</table>

X. Action for This Document

<table>
<tr><td rowspan="5">Motion</td><td></td><td>This Document passed TC Chapter review as balloted and will be forwarded to the ISC A&R SC for procedural review.</td></tr>
<tr><td>x</td><td>This Document passed TC Chapter review with editorial changes and will be forwarded to the ISC A&R SC for procedural review.</td></tr>
<tr><td></td><td>This Document passed TC Chapter review with technical changes and with or without editorial changes and will be forwarded to the ISC A&R SC for procedural review. A Ratification Ballot will be issued to verify the technical changes.</td></tr>
<tr><td></td><td>This Document failed TC Chapter review and will be returned to the TF for rework.</td></tr>
<tr><td></td><td>This Document failed TC Chapter review and work will be discontinued.</td></tr>
<tr><td colspan="2">Motion by/ 2nd by</td><td colspan="2">By: Christian Kranert (Fraunhofer)
Second: Caroline Chèze (Scientific Visual SA)</td></tr>
<tr><td colspan="2">Discussion</td><td colspan="2">XXXX</td></tr>
<tr><td colspan="2">Vote</td><td colspan="2">4-Y 0-N</td></tr>
<tr><td colspan="2" rowspan="2">Final Action</td><td>x</td><td>Motion passed</td></tr>
<tr><td></td><td>Motion failed</td></tr>
</table>

Note: If the use of PMPT or copyrighted item is justified by the TC Chapter, LOA or release form must be received before publication can proceed.