

Effect of Al_2O_3 Inclusions or Mold Flux Particles on Their Surrounding Microstructures of Sliver Defects on the Surface of Automobile Exposed Panel

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Supplementary Materials

The EBSD data of samples 2, 3, 4, 6, 7, 8, 10, 11, and 12 are presented in the supplementary material.

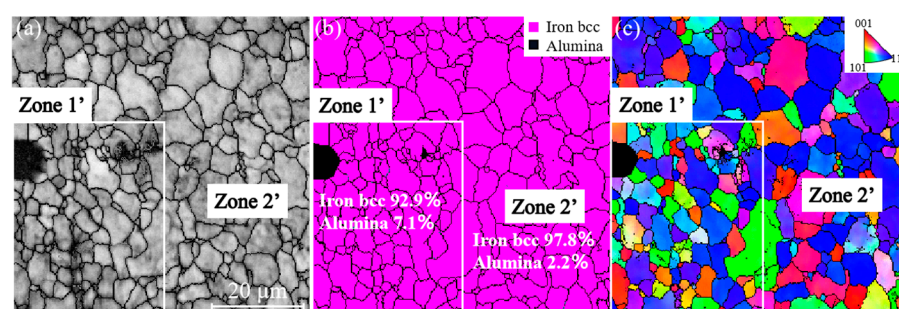


Figure S1. Grain boundary distribution (GBD), phase distribution (PD), and crystal orientation maps (COM) on Al_2O_3 sliver defect of sample 2. (a) GBD; (b) PD; and (c) COM.

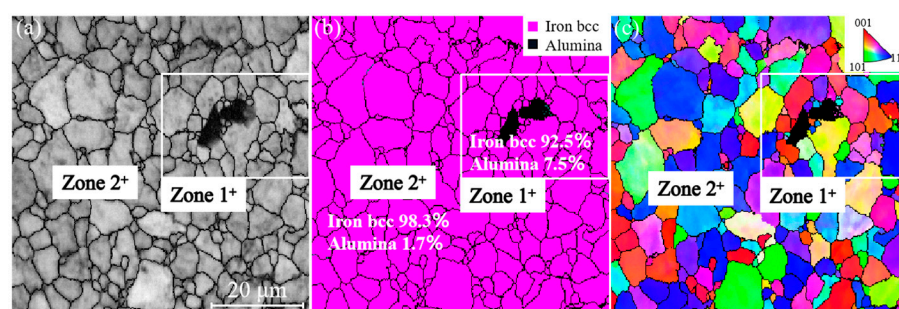


Figure S2. GBD, PD, and COM on Al_2O_3 sliver defect of sample 3. (a) GBD; (b) PD; and (c) COM.

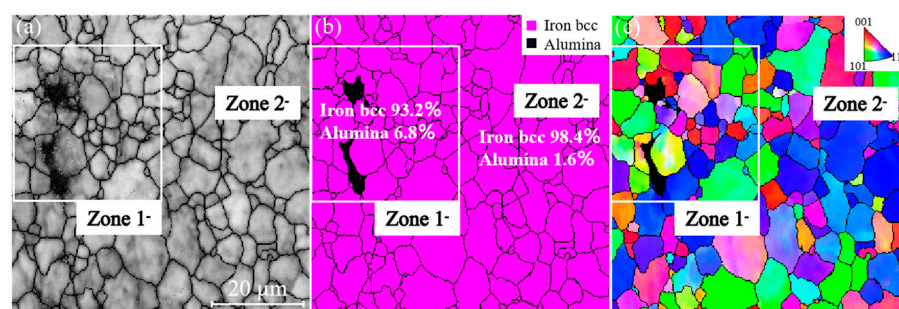


Figure S3. GBD, PD, and COM on Al_2O_3 sliver defect of sample 4. (a) GBD; (b) PD; and (c) COM.

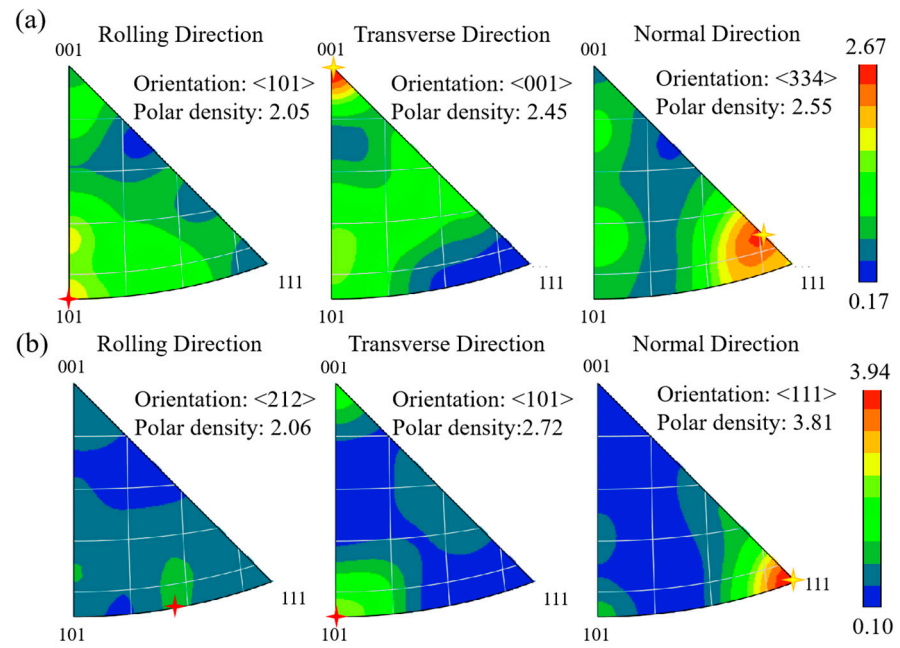


Figure S4. Inverse pole figures (IPF) in rolling direction (RD), transverse direction (TD), and normal direction (ND) of Al₂O₃ sliver defect on sample 2. (a) Zone 1'; (b) zone 2'.

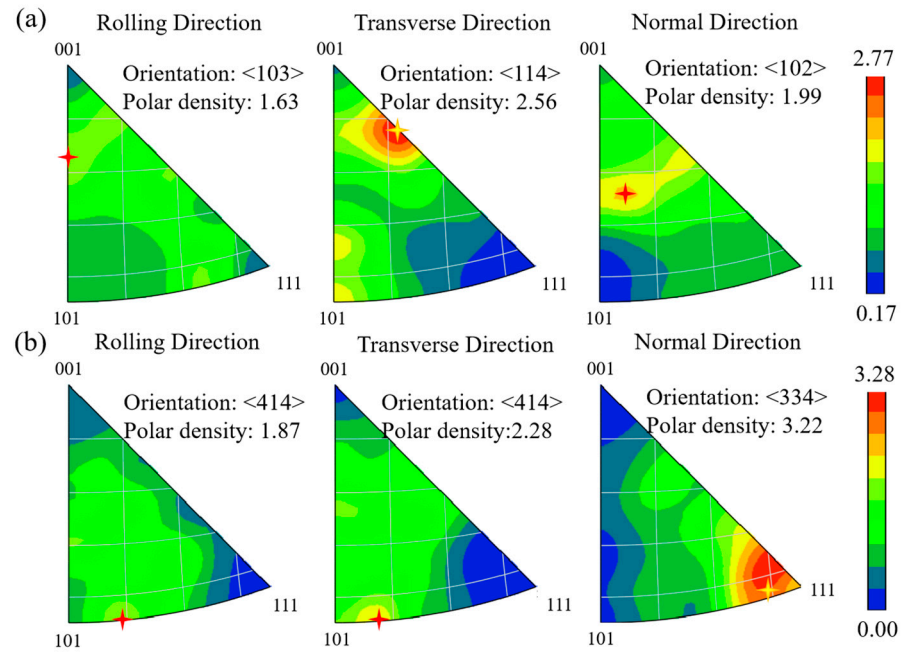


Figure S5. IPF in RD, TD, and ND of Al₂O₃ sliver defect on sample 3. (a) Zone 1+; (b) zone 2+.

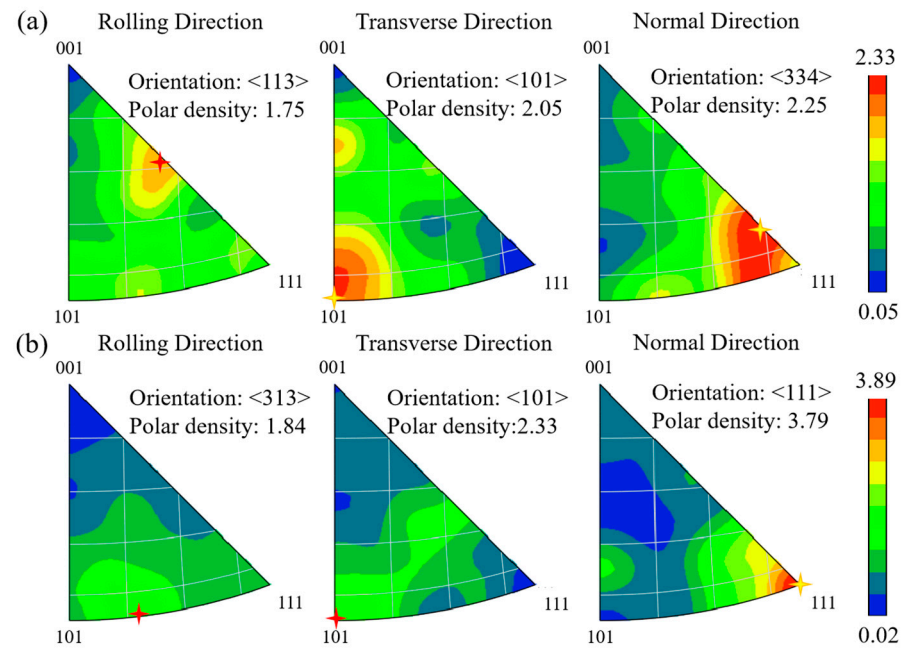


Figure S6. IPF in RD, TD, and ND of Al₂O₃ sliver defect on sample 4. (a) Zone 1; (b) zone 2.

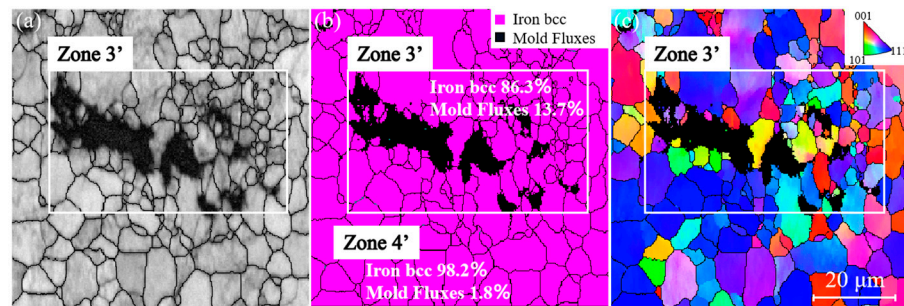


Figure S7. GBD, PD, and COM on mold flux sliver defect of sample 6. (a) GBD; (b) PD; and (c) COM.

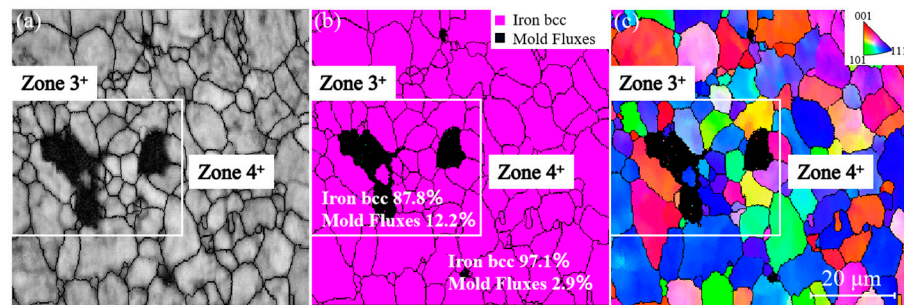


Figure S8. GBD, PD, and COM on mold flux sliver defect of sample 7. (a) GBD; (b) PD; and (c) COM.

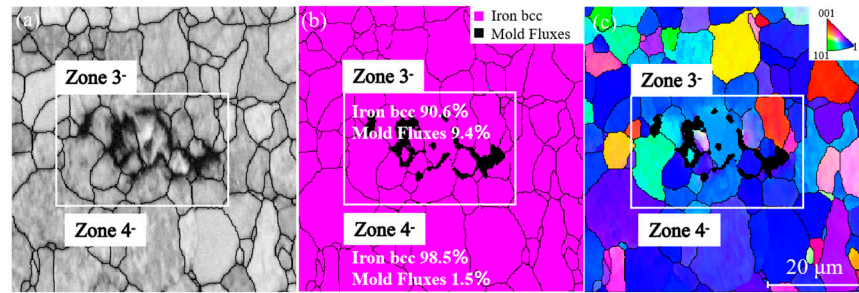


Figure S9. GBD, PD, and COM on mold flux sliver defect of sample 8. (a) GBD; (b) PD; and (c) COM.

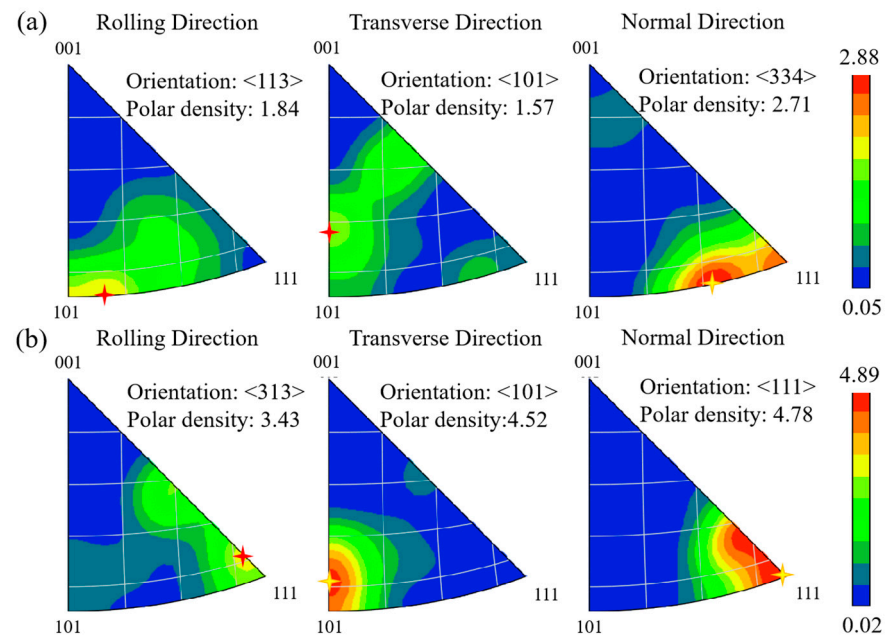


Figure S10. IPF in RD, TD, and ND of Al_2O_3 sliver defect on sample 6. (a) Zone 1'; (b) zone 2'.

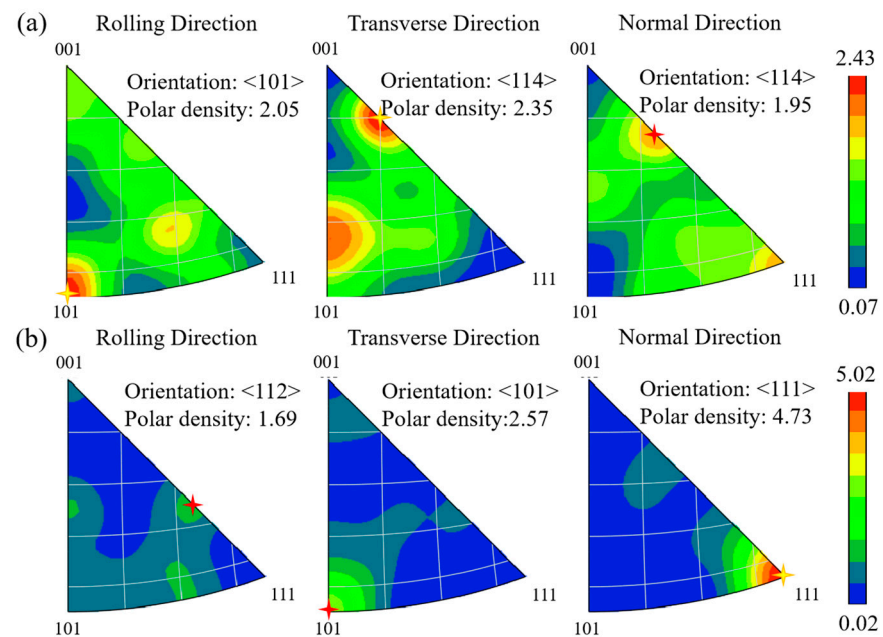


Figure S11. IPF in RD, TD, and ND of Al_2O_3 sliver defect on sample 7. (a) Zone 1+; (b) zone 2+.

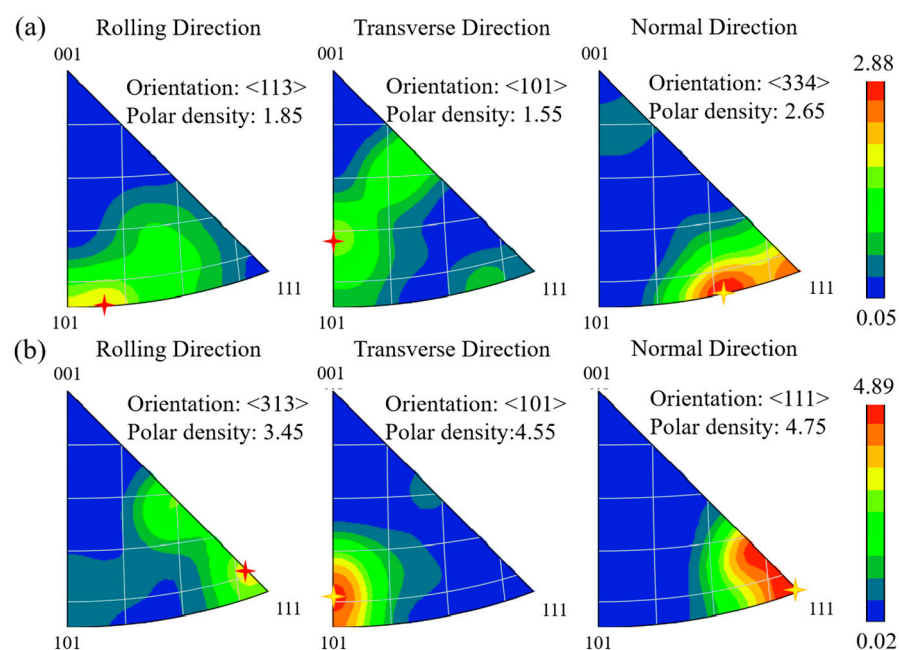


Figure S12. IPF in RD, TD, and ND of Al_2O_3 sliver defect on sample 8. (a) Zone 1; (b) zone 2.

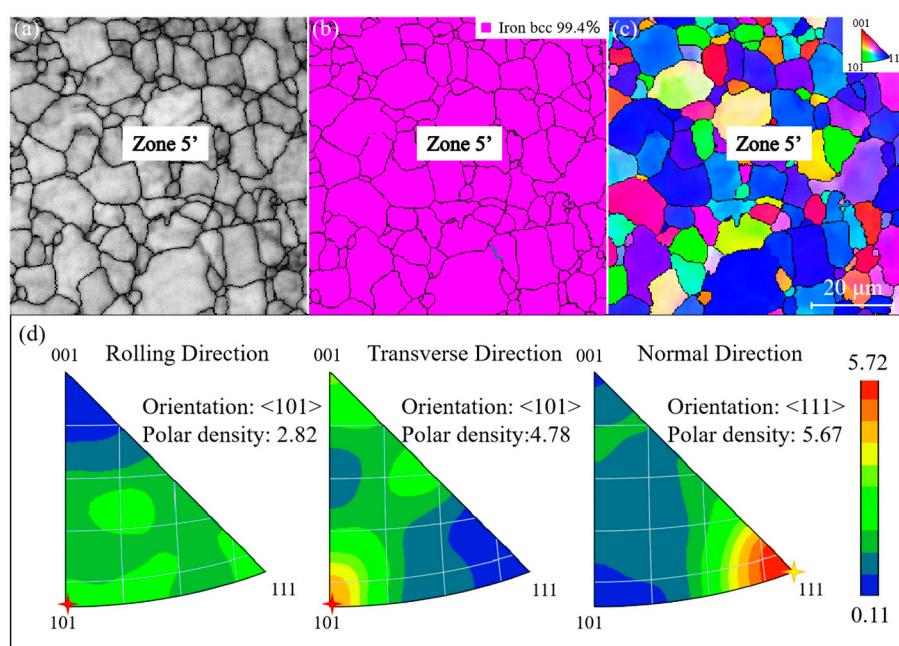


Figure S13. GBD, PD, COM, and IPF on non-defect zone (NDZ) of sample 10. (a) GBD; (b) PD; (c) COM; and (d) IPF.

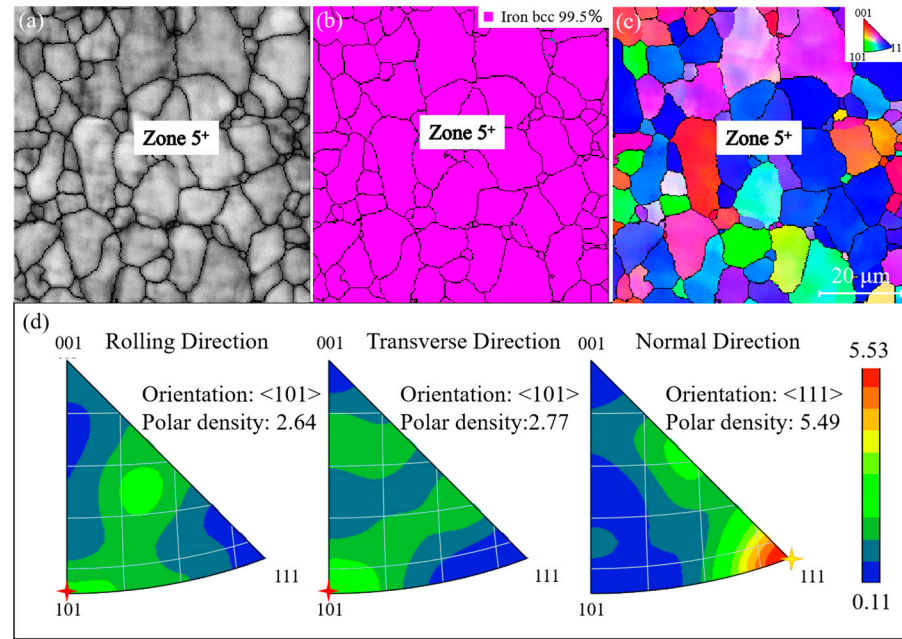


Figure S14. GBD, PD, COM, and IPF on non-defect zone (NDZ) of sample 11. (a) GBD; (b) PD; (c) COM; and (d) IPF.

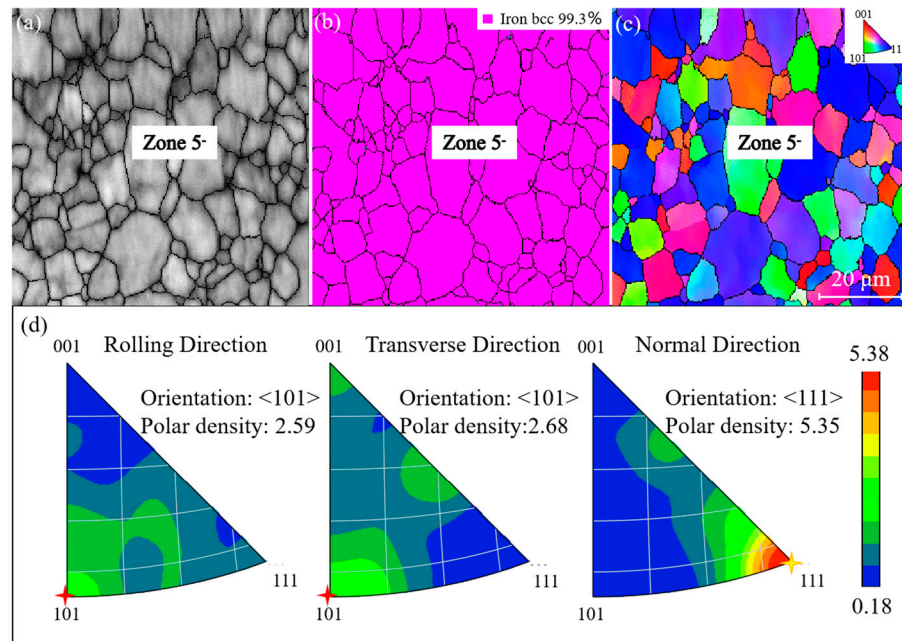


Figure S15. GBD, PD, COM, and IPF on non-defect zone (NDZ) of sample 12. (a) GBD; (b) PD; (c) COM; and (d) IPF.

Table S1. Statistical results of crystal orientations and microtexture in different zones of samples 2, 3, 4, 6, 7, 8, 10, 11, and 12.

Aample	Zone	Zone Types	X (RD)		Y (TD)		Z (ND)		Max PD	Microtexture
			OR	PD	OR	PD	OR	PD		
2	Zone 1'	Al ₂ O ₃ DZ+Al ₂ O ₃	<101>	2.05	<001>	2.45	<334>	2.55	2.67	{334}<101>
2	Zone 2'	Al ₂ O ₃ DZ-Al ₂ O ₃	<212>	2.06	<101>	2.72	<111>	3.81	3.94	{111}<212>
3	Zone 1+	Al ₂ O ₃ DZ+Al ₂ O ₃	<103>	1.63	<114>	2.56	<102>	1.99	2.77	{102}<103>
3	Zone 2+	Al ₂ O ₃ DZ-Al ₂ O ₃	<414>	1.87	<414>	2.28	<334>	3.22	3.28	{334}<414>
4	Zone 1-	Al ₂ O ₃ DZ+Al ₂ O ₃	<113>	1.75	<101>	2.05	<334>	2.25	2.33	{334}<113>

4	Zone 2 ⁻	Al ₂ O ₃ DZ-Al ₂ O ₃	<313>	1.84	<101>	2.33	<111>	3.79	3.88	{111}<313>
6	Zone 3 [']	MFDZ+MFP	<313>	2.42	<102>	3.15	<103>	2.18	3.31	{103}<313>
6	Zone 4 [']	MFDZ-MFP	<203>	2.55	<101>	2.57	<111>	4.99	5.09	{111}<203>
7	Zone 3 ⁺	MFDZ+MFP	<101>	2.05	<114>	2.35	<114>	1.95	2.43	{114}<101>
7	Zone 4 ⁺	MFDZ-MFP	<112>	1.69	<101>	2.57	<111>	4.73	5.02	{111}<112>
8	Zone 3 ⁻	MFDZ+MFP	<113>	1.84	<101>	1.57	<334>	2.71	2.88	{334}<113>
8	Zone 4 ⁻	MFDZ-MFP	<313>	3.43	<101>	4.52	<111>	4.78	4.89	{111}<313>
10	Zone 5 [']	NDZ	<101>	2.82	<101>	4.87	<111>	5.67	5.72	{111}<101>
11	Zone 5 ⁺	NDZ	<101>	2.64	<101>	2.77	<111>	5.49	5.53	{111}<101>
12	Zone 5 ⁻	NDZ	<101>	2.59	<434>	2.56	<111>	5.69	5.84	{111}<101>

Remarks: "+" means with; "-" means without; OR is the abbreviation of orientation; PD is the abbreviation of polar density; and Max is the abbreviation of maximum.

Table S2. Statistical results of grain size distributions of different zones on samples 1, 5, and 9.

Sample	Zone	Zone Types	Min	Max	Difference between Max and Min	Average
2	Zone 1 [']	Al ₂ O ₃ DZ with Al ₂ O ₃	0.57	12.33	11.76	3.52
2	Zone 2 [']	Al ₂ O ₃ DZ without Al ₂ O ₃	0.67	14.13	13.46	4.19
3	Zone 1 ⁺	Al ₂ O ₃ DZ with Al ₂ O ₃	0.64	12.02	11.38	3.45
3	Zone 2 ⁺	Al ₂ O ₃ DZ without Al ₂ O ₃	0.77	14.96	14.19	4.17
4	Zone 1 ⁻	Al ₂ O ₃ DZ with Al ₂ O ₃	0.65	9.37	8.72	3.27
4	Zone 2 ⁻	Al ₂ O ₃ DZ without Al ₂ O ₃	0.43	14.81	14.38	4.23
6	Zone 3 [']	MFDZ with MFP	1.14	15.42	14.28	3.56
6	Zone 4 [']	MFDZ without MFP	1.14	21.14	20.00	4.87
7	Zone 3 ⁺	MFDZ with MFP	1.79	12.09	10.30	3.78
7	Zone 4 ⁺	MFDZ without MFP	1.77	21.14	19.37	5.31
8	Zone 3 ⁻	MFDZ with MFP	0.53	17.69	17.16	3.88
8	Zone 4 ⁻	MFDZ without MFP	0.57	15.2	14.63	4.34
10	Zone 5 [']	NDZ	0.46	21.16	20.80	5.74
11	Zone 5 ⁺	NDZ	0.46	18.71	18.25	5.97
12	Zone 5 ⁻	NDZ	0.48	19.83	19.35	5.59

Remarks: Max is the abbreviation of maximum; Min is the abbreviation of minimum.