

Supplementary Table S1. Mechanical properties of 17-4 PH SS produced by L-PBF from previous studies [23, 26-31]

Ref. No.	Title	Heat treatment	Building direction	Yield strength (MPa)	Elongation (%)
23	LeBrun, T.; Nakamoto, T.; Horikawa, K.; Kobayashi, H. Effect of retained austenite on subsequent thermal processing and resultant mechanical properties of selective laser melted 17-4 PH stainless steel. Mater. Des. 2015, 81, 44-53.	AB	NA	661	16.2
		CA	NA	939	9
		H900	NA	945	15.5
		H1025	NA	870	13.3
		H1150	NA	1005	11.1
		CA+H900	NA	1352	4.6
		CA+H1025	NA	1121	9.6
26	Auguste, P.; Mauduit, A.; Fouquet, L.; Pilot, S. Study on 17-4 PH stainless steel produced by selective laser melting. UPB. Sci. Bull. Ser. B-Chem. Mater. Sci. 2018, 80, 197-210.	CA+H1150	NA	859	16.6
		AB	H	850	13
		AB	V	760	2.5
		550 °C/4 hr	H	1210	0.5
		1040 °C/1.5 hr + 480 °C/1 hr	H	785	4.6
		1040 °C/1.5 hr + 480 °C/1 hr	V	590	1
		1190 °C/2 hr +1040 °C/1.5 hr +480 °C/1 hr	H	1400	3
27	Nezhadfar, P. D.; Burford, E.; Anderson-Wedge, K.; Zhang, B.; Shao, S.; Daniewicz, S. R.; Shamsaei, N. Fatigue crack growth behavior of additively manufactured 17-4 PH stainless steel: Effects of build orientation and microstructure. Int. J. Fatig. 2019, 123, 168-179.	1190 °C/2 hr +1040 °C/1.5 hr +480 °C/1 hr	V	1240	1
		AB	H	650	9.8
		AB	V	720	6.4
		1038 °C/0.5 hr + 482 °C/1 hr	H	910	7.8
		1038 °C/0.5 hr + 482 °C/1 hr	V	950	3.5
28	Yadollahi, A.; Shamsaei, N.; Thompson, S. M.; Elwany, A.; Bian, L. Effects of building orientation and heat treatment on fatigue behavior of selective laser melted 17-4 PH stainless steel. Int. J. Fatig. 2017, 94, 218-235.	1050 °C/0.5 hr + 552 °C/4 hr	V	1176	32.7
		AB	H	650	14.5
		AB	V	580	5.8
		CA + H900	H	1250	11
29	Hu, Z.; Zhu, H.; Zhang, H.; Zeng, X. Experimental investigation on selective laser melting of 17-4PH stainless steel. Optic. Laser. Tech. 2017, 87, 17-25.	CA + H900	V	1020	2.8
		1040 °C/0.5 hr + 550 °C/4 hr	NA	1032	16.64
30	Pasebani, S.; Ghayoor, M.; Badwe, S.; Irrinki, H.; Atre, S. V. Effects of atomizing media and post processing on mechanical properties of 17-4 PH stainless steel manufactured via selective laser melting. Addit. Manuf. 2018, 22, 127-137.	H1150	NA	1116	5.1

AB: as-built

NA: not available

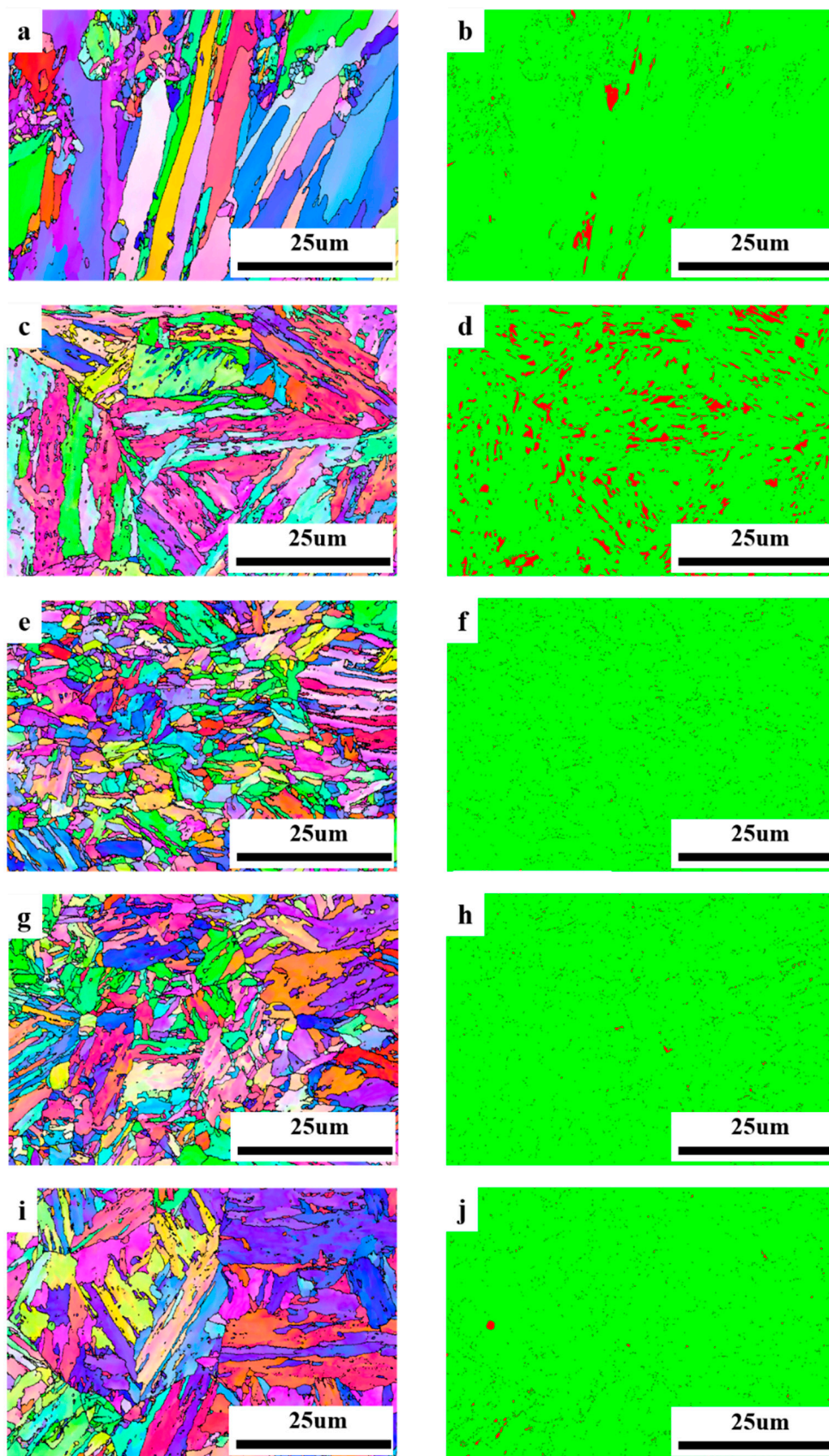
H: horizontal direction

V: vertical direction

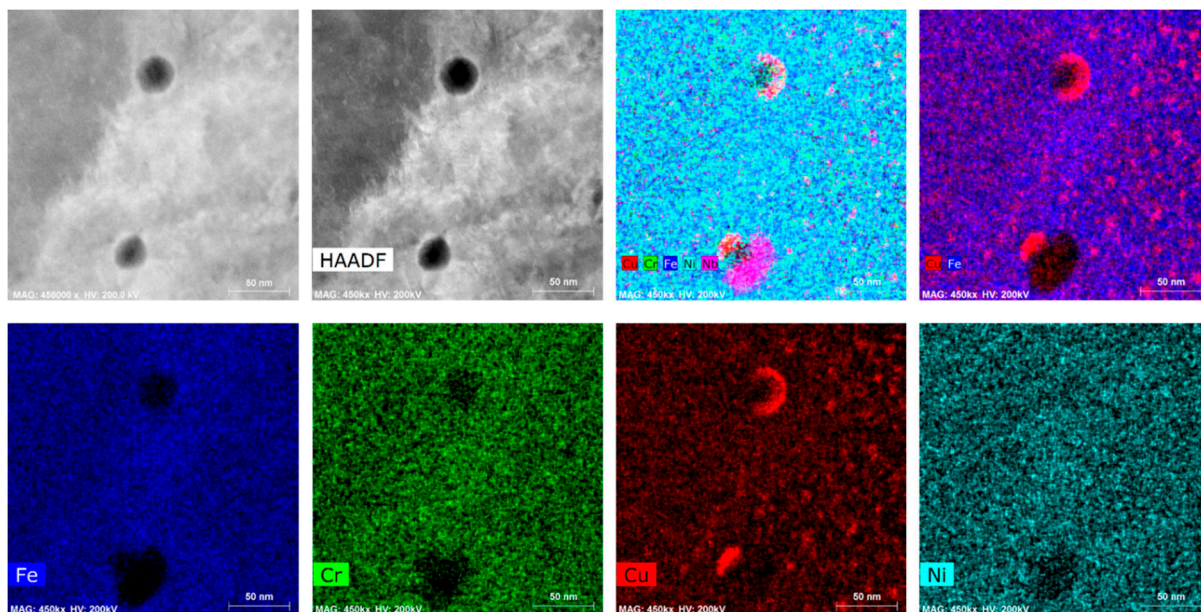
CA: condition A

Supplementary Table S2. Result of EBSD-Phases map showing phases fraction of AB and HT specimens

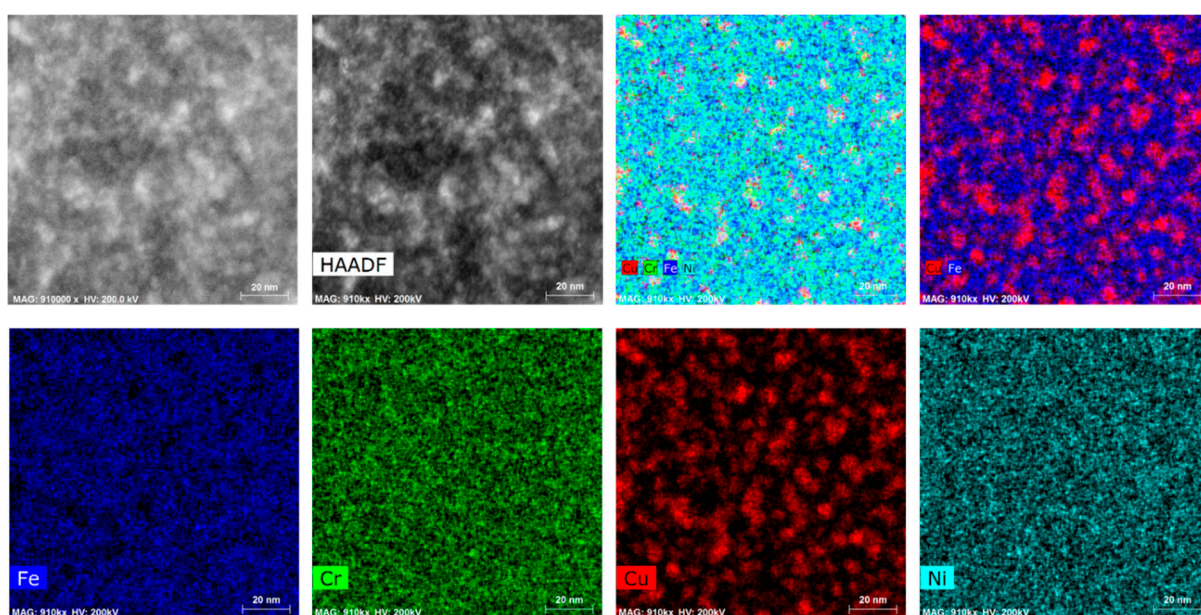
Specimens	FCC (austenite) fraction (%)	BCC (ferrite and/or martensite) fraction (%)
AB	1.7	98.3
N	9.8	90.2
S	1.0	99.0
SA	0.9	99.1
NSA	1.0	99.0



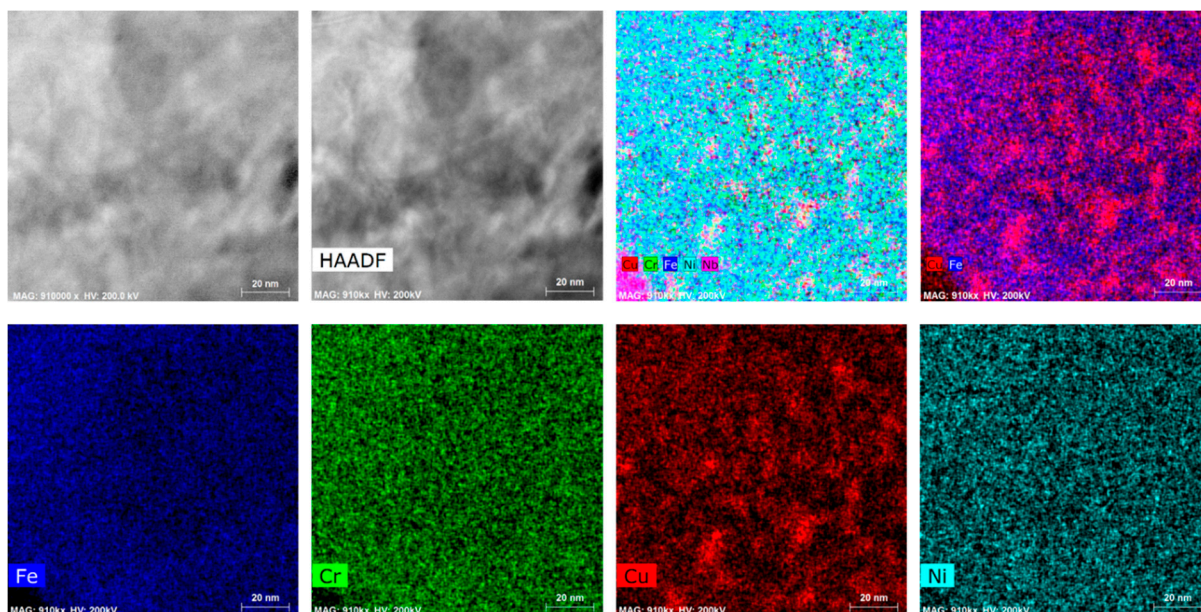
Supplementary Figure S1. EBSD orientation maps and Phase maps (green: ferrite and/or martensite, red: austenite) obtained from the as-built and heat treated 17-4 PH samples: (a-b) AB, (c-d) N, (e-f) S, (g-h) SA, (i-j) NSA.



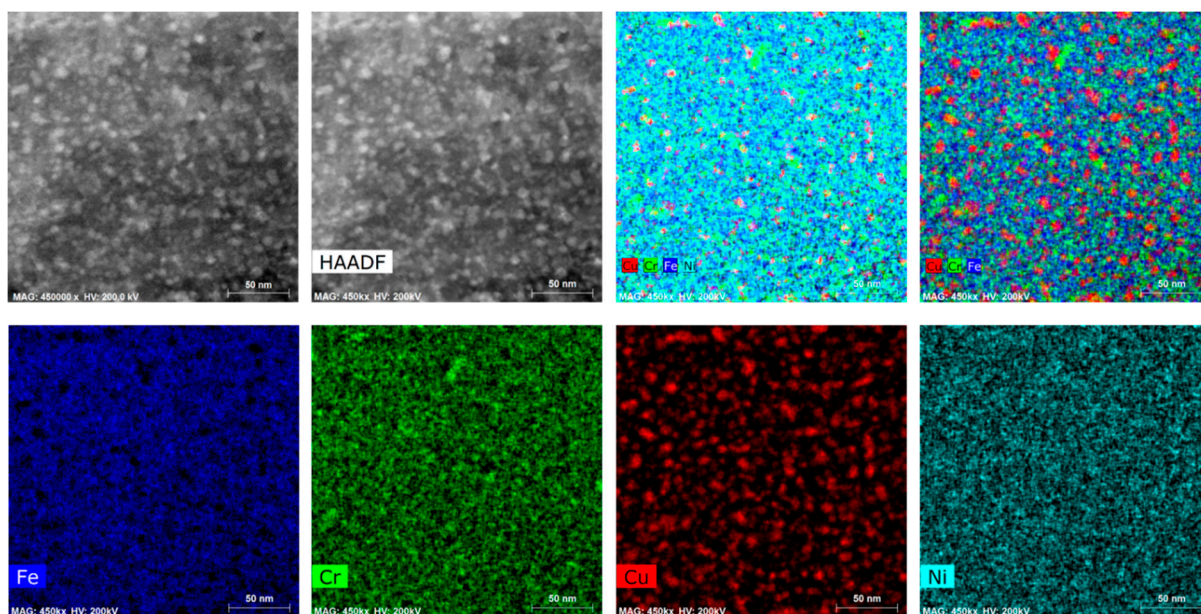
Supplementary Figure S2. TEM-EDS analysis of SA specimen showing inhomogeneous Cu-rich precipitation (magnification: 450 kx)



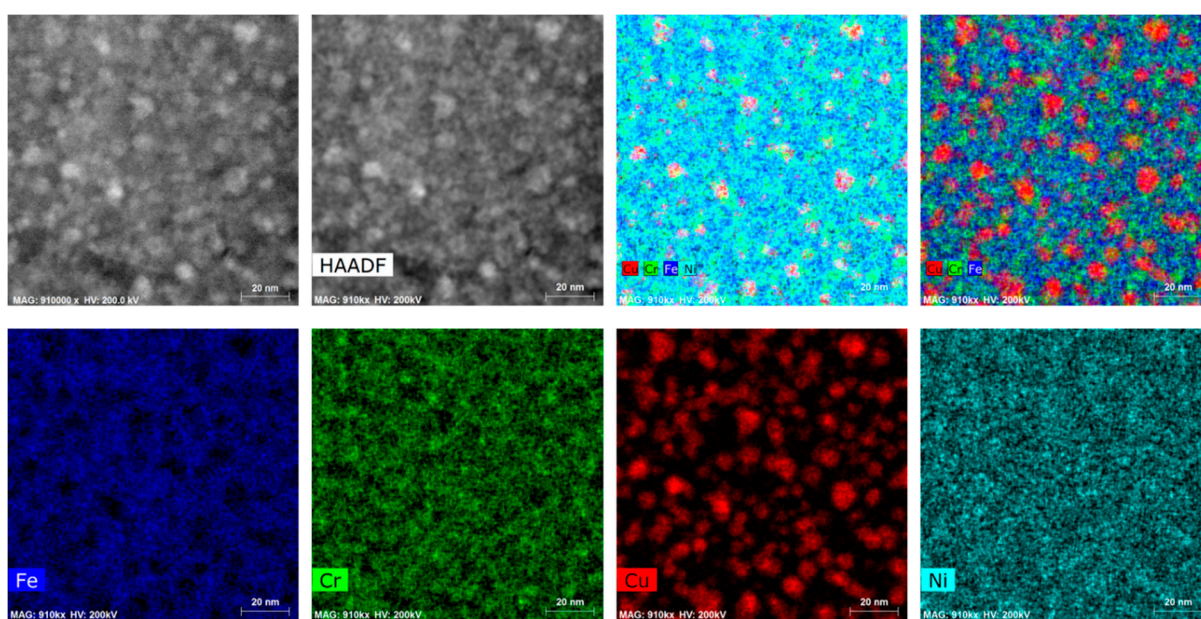
Supplementary Figure S3. TEM-EDS analysis of SA specimen showing nano-scale Cu-rich precipitation (magnification: 910 kx)



Supplementary Figure S4. TEM-EDS analysis of SA specimen showing homogeneous Cu-rich precipitation (magnification: 910 kx)



Supplementary Figure S5. TEM-EDS analysis of **NSA specimen** showing homogeneous nano-scale Cu-rich precipitation (magnification: 450 kx)



Supplementary Figure S6. TEM-EDS analysis of **NSA specimen** showing homogeneous nano-scale Cu-rich precipitation (magnification: 910 kx)