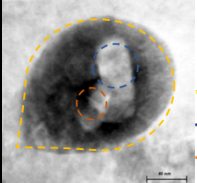
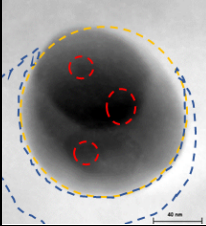
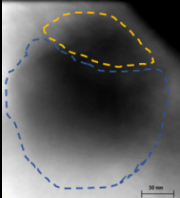
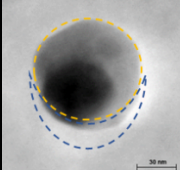
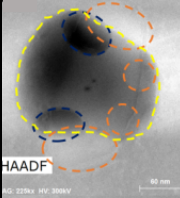


Table S1: Evolution of precipitate compositions after each SSTC compared to the previous state (initial or treated). Figures indicating the different zones/inclusions in mixed precipitates are added when necessary.

Lamella	SSTC	Precipitate		Elements that increased in Max content	Elements that decreased in Max content	Figures
L1	SSTC1a	P1 ₁	1 st zone	O, P, C	Mn, S, Mo, Cr	<p>HAADF Mag. 200kx HV 200kV 50 nm</p> <p>--- Zone 1 --- Zone 3 --- Zone 2 --- Oxides</p>
			2 nd zone	O	S	
			3 rd zone	S, C	Cr, O, Mn	
			Inclusions	C	Mn, Si, O	
				C	Mn, Si, O	
				O, Si		
				O, C	Mn, Si	
				C	Mn	
		P2 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P3 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P4 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P5 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P6 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P7 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P8 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P9 ₁	1 st zone	Ni, C, P	Cr, S, Mo, Mn, O, Si	<p>HAADF Mag. 200kx HV 200kV 50 nm</p> <p>--- Zone 1 --- Zone 2 --- Zone 3</p>
			2 nd zone	Ni, Mn, Si, C, P	Cr, Mo, S	
			3 rd zone	Ni, Mo, O, Si, P	S	
		P10 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P11 ₁		Cr, Mo, S, P, C	Fe, Ni	
		P12 ₁	Large zone	Mn, Si, O, P, Cr, Mo, S	Fe, Ni	
			Inclusion	Mn, Si, O, P, Cr, Mo, S	Fe, Ni, C	
		P13 ₁	Central zone	Si, O, P, Cr, Mo, S	Fe, Ni	
			Surrounding ring	Cr		
		P14 ₁	Central zone	Mn, Si, O, P, Cr, Mo, S, C	Fe, Ni	
			Surrounding ring	Cr		
		P15 ₁	1 st zone	Si, O, P, Cr, S	Mn, C, Ni, Mo	<p>HAADF Mag. 200kx HV 200kV 50 nm</p> <p>--- Zone 1 --- Zone 2</p>
2 nd zone	Cr, S, Mn, P, O		Ni, Mo, C			
P16 ₁		Ni, S, Mn, P	Cr, Mo, C, Si, O			
L1	SSTC1b	P1 ₁	1 st zone		Cr, Mn, O, Si	

			2 nd zone	Fe, C	Cr, P	
			3 rd zone		Cr	
		Inclusions		O	Mn, Cr	
				O	Mn, Cr	
				P	O, Si	
				Cr, P	Mn	
				P	Mn	
		P2 ₁		Fe, Ni	Cr, Mo, S, P	
		P3 ₁		Fe, Ni	Cr, Mo, S, P	
		P4 ₁		Fe, Ni	Cr, Mo, S, P	
		P5 ₁		Fe, Ni	Cr, Mo, S, P	
		P6 ₁		Fe, Ni	Cr, Mo, S, P	
		P7 ₁		Fe, Ni	Cr, Mo, S, P	
		P8 ₁		Fe, Ni	Cr, Mo, S, P	
		P9 ₁	1 st zone	Si	Cr, Mo, S, O, C, P	
			2 nd zone	Mo, S, Mn, Si	Ni, Cr, C, P	
			3 rd zone	Ni, Mo, O, Si, P		
		P10 ₁		Fe, Ni	Cr, Mo, S, P	
		P11 ₁		Fe, Ni	Cr, Mo, S, P	
		P12 ₁		Fe, Ni, C, Cr	Mn, O, P, Mo, S	
			Inclusion	Fe, Ni, Mo, Si	Cr, O, P	
		P13 ₁	Central zone	Fe, Si, C, S	Mn, P	
			Surrounding ring	Cr		
		P14 ₁	Central zone	Fe, Ni	C, O, Si, P, Mo, S	
			Surrounding ring	Cr, P		
		P15 ₁	1 st zone	C, Fe, Ni	P, Cr, S	
			2 nd zone	C, Si, Ni, Mo	P, Mn, O, Cr, S	
		P16 ₁		Ni, Mo, Mn	Cr, C, O	
L2	SSTC2	P1 ₂		Fe, Ni, P, Mo	Mn, Si, O	
		P2 ₂	Central zone	Mn, O, Si	Fe, Ni, Cr, S	
			Surrounding ring	Cr		
		P3 ₂	1 st zone	P, Fe, Ni, Mo, Cr	Mn, O, Si, S	
			2 nd zone	Si		
3 rd zone	Coalesced with the 2 nd zone					

		P4 ₂	1 st zone	Mo, P, Cr, Fe, Ni	Mn, S		
			2 nd zone	Fe, Ni,	Mo, P, Cr, S		
			Inclusions	Coalesced O, C, Si			
		P5 ₂	Dissolved				
		P6 ₂	1 st zone	Si, C, P, Fe, Cr, Ni	Mn, S		
			2 nd zone	Dissolved			
		P7 ₂			Si, O, P, Ni, Mo	Mn, S	
		P8 ₂	1 st zone		Mn, S		
			2 nd zone	Mo, P	Cr		
		P9 ₂	Central zone	Fe, Cr, S	O, Mn, Si, C, P, Mo		
			Surrounding ring	Cr			
		P10 ₂	Central zone	Fe, Ni, Cr	Mn, Si, O		
			Surrounding ring		Cr		
P11 ₂			Mn, O, Si, P, Ni, Mo	Fe, Cr			
L3	SSTC3	P1 ₃		O, Cr, C	Fe, Ni, Mn, Mo, S		
		P2 ₃	1 st zone	O, Cr, C	Fe, Ni, Mn, Mo, S		
			2 nd zone		Mo, Cr, P		
3 rd zone	Mo, S						
L4	SSTC4	P1 ₄	Central zone	Fe, Ni, Cr, P, Mo	Mn, O, Si, C, S		
			Surrounding ring	Disappeared			
		P2 ₄	Central zone	Fe, Ni, Cr, P, Mo, C, S	Mn, O, Si		
			Surrounding ring	Disappeared			
		P3 ₄			Fe, Mn	O, Si, P, C, S, Mo	
P4 ₄			Fe	O, Si			
P5 ₄	Central zone	Fe, Ni, Cr	Mn, O, Si, C, P, S, Mo				

			Surrounding ring	Disappeared		
		P6 ₄		Fe, Ni	Mn, O, Si, P, C, Cr, S	
		P7 ₄		Fe, Ni	O, Si, P, Cr, Mo, S	
		P8 ₄		Dissolved		
L5	SSTC5a	P1 ₅	Central zone		Mn, Si	
			Surrounding ring		Cr, Mn	
		P2 ₅	Central zone		Mn, Si	
			Surrounding ring		Cr, Mn	
		P3 ₅			Mn, Si	
		P4 ₅	Central zone		Mn, Si	
			Surrounding ring		Cr, Mn	
		P5 ₅	1 st zone	Mn, Mo, Cr	Si	
2 nd zone	Dissolved					
L6	SSTC6	P1 ₆		Fe, Cr, Ni, Mo, Si, P	Mn, S	
		P2 ₆		Cr, Si, Mo, P, S	Ni, Mn, O	
		P3 ₆		Fe, O, Si, P, C, Mo, S	Cr, Mn, Ni	
		P4 ₆		Cr, O, Si, P, S, Mo, C	Fe, Mn, Ni	
		P5 ₆		Cr, O, Si, P, S, Mo, C	Fe, Mn, Ni	

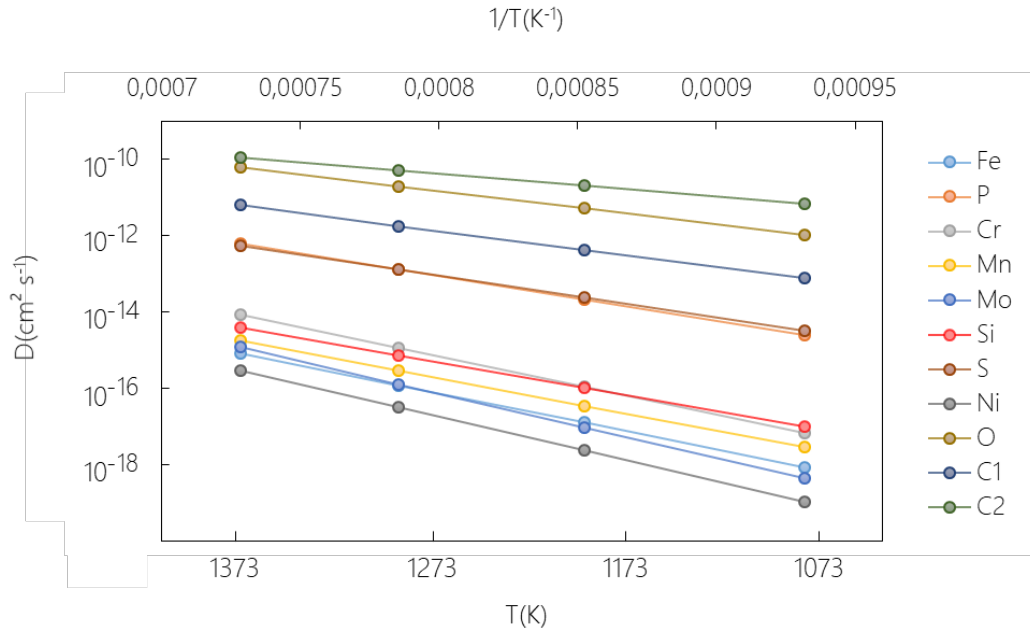


Figure S1: Diffusion coefficients in austenite of the elements present in the 316LSS [1–3]. For C, two formulae obtained by two different methods (liquid carburization and solid carburization) are plotted to emphasize on the possible difference in the order of magnitude of D values that can result (specially for interstitial elements).

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