Supplementary Information

Table S1 Chemical compositions (wt.%) of the 316L SSs investigated in this study. The higher contents of O and N in the SLM alloy primarily originated from the powder sources [S1].

Material	Fe	Cr	Ni	Mo	C	Mn	P	S	Si	O	N
SLM	Bal.	16.7	10.8	2.25	0.011	1.20	0.023	0.0049	0.54	0.041	0.170
CM	Bal.	16.4	10.0	2.05	0.022	1.04	0.030	0.0018	0.40	0.003	0.011

Table S2 Comparison of the H diffusivities in the SLM and CM 316L alloys, which were obtained from gas-phase permeation tests, reported in the literature. The diffusivity of H in the alloy, D_H, follows the Arrhenius relation, $D_H = D_0 \exp\left(-E_d/RT\right)$, where D_0 is a material constant, E_d is the activation barrier energy for diffusion, R is the universal gas constant (8.314 $J \cdot mol^{-1} \cdot K^{-1}$), and T is the absolute temperature.

	Manufacturing method	D_0 [m^2/s]	E_d [kJ/mol]	D_H @RT [m^2/s]	D_H @50 °C [m^2/s]
Lin *et al*. [S2]	SLM	1.01×10^{-6}	56.16	1.43×10^{-16}	8.28×10^{-16}
Brass & Chêne [S3]	CM	6.20×10^{-7}	53.63	2.44×10^{-16}	1.30×10^{-15}
Lee *et al*. [S4]		1.24×10^{-6}	55.10	2.69×10^{-16}	1.51×10^{-15}
San Marchi *et al.* [S5]		8.90×10^{-7}	53.90	3.14×10^{-16}	1.69×10^{-15}
Kishimoto *et al*. [S6]		1.30×10^{-6}	54.03	4.35×10^{-16}	2.35×10^{-15}

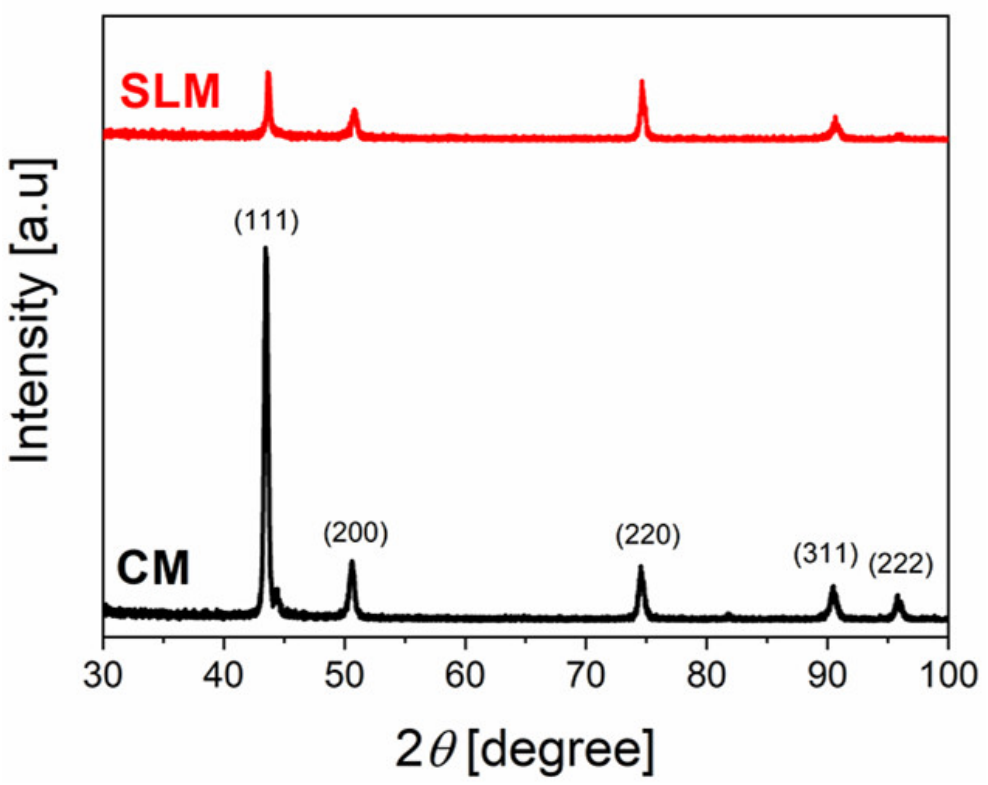

Figure S1 X-ray diffraction (XRD; D/MAX-2500, Rigaku-Denki, Tokyo, Japan) scan results of CM and AM 316L specimen.

References

[S1] Y.M. Wang, T. Voisin, J.T. McKeown, J. Ye, N.P. Calta, Z. Li, Z. Zeng, Y. Zhang, W. Chen, T.T. Roehling, R.T. Ott, M.K. Santala, P.J. Depond, M.J. Matthews, A. V. Hamza, T. Zhu, Nat. Mater. 17 (2018) 63–70.

[S2] J. Lin, F. Chen, F. Liu, D. Xu, J. Gao, X. Tang, Mater. Chem. Phys. 250 (2020) 123038.

[S3] A.M. Brass, J. Chene, Mater. Sci. Eng. A 242 (1998) 210–221.

[S4] S.K. Lee, S.H. Yun, H.G. Joo, S.J. Noh, Curr. Appl. Phys. 14 (2014) 1385–1388.

[S5] C. MARCHI, B. SOMERDAY, S. ROBINSON, Int. J. Hydrogen Energy 32 (2007) 100–116.

[S6] N. Kishimoto, T. Tanabe, T. Suzuki, H. Yoshida, J. Nucl. Mater. 127 (1985) 1–9.