Supplementary material to:

Highly printable Fe_3Al intermetallic alloy

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Table S1. Range of process parameters used to print samples in this study.

Process parameter	Value/Range
Laser power (W)	200
Hatching distance (mm)	100
Scanning speed (mm/s)	250-2000 (increment 250)
Layer thickness (mm)	0.05, 0.1
Volumetric energy density (J/mm^3)	160-10

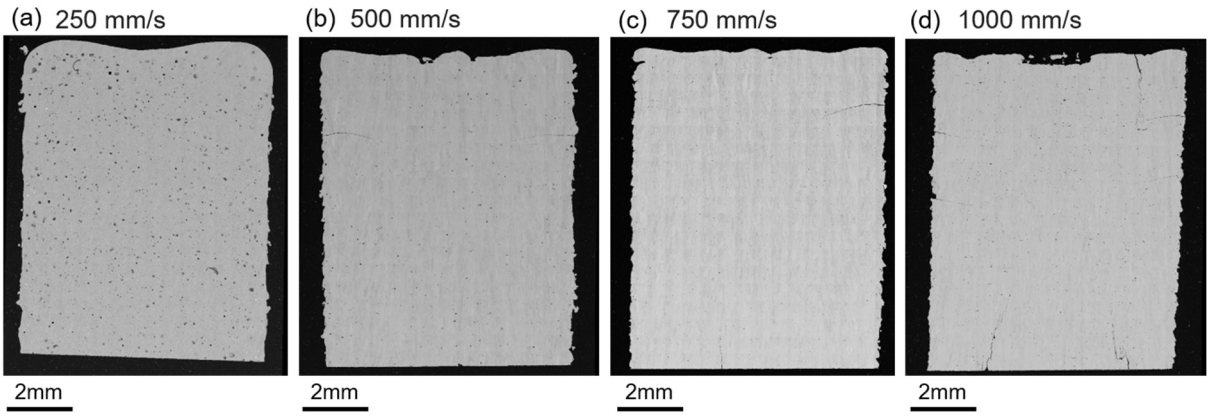


Figure S1. Defects distribution of the as-built LPBF samples. a–d, BSE-SEM microscopy images showing the defects of the as-built samples printed at a laser power of 200W and a layer thickness of 0.05 mm under different scan speeds varied from 250 to 1000 mm/s. Nearly fully dense samples (less than 1% porosity) are obtained when the laser scanning speed is between 500 mm/s and 1000 mm/s.

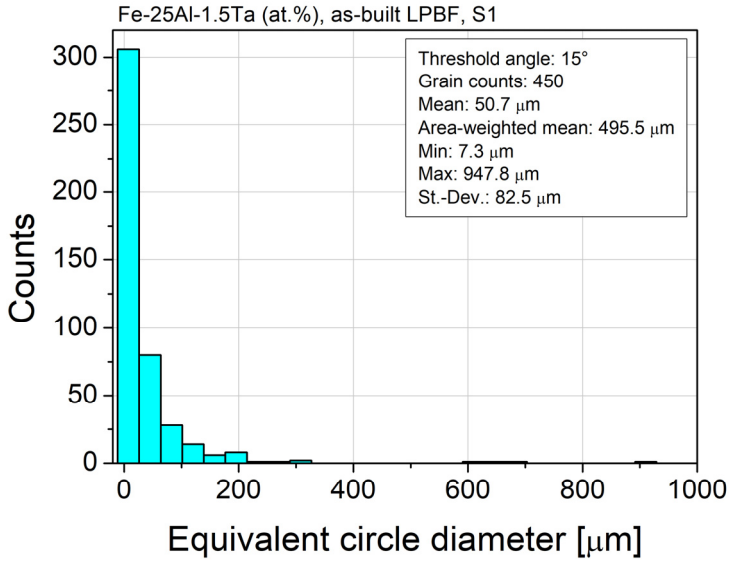


Figure S2. The grain size distribution in the Fe-25Al-1.5Ta as-built LPBF sample S1 showing a non-uniform grain size distribution.

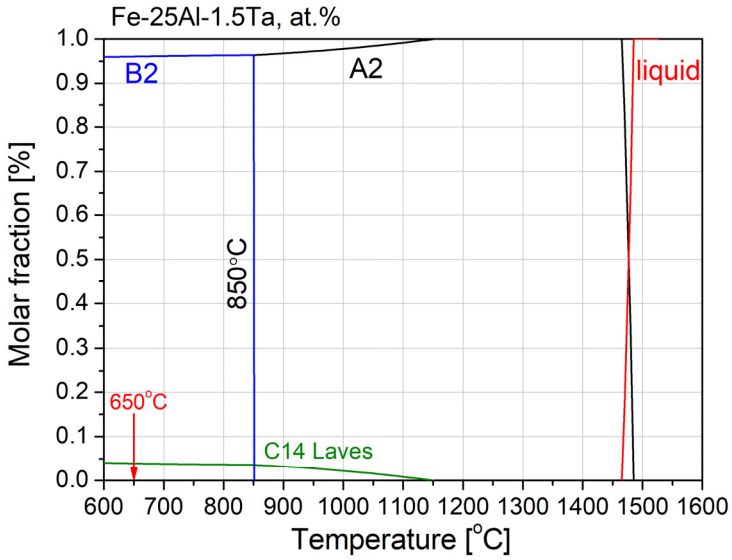


Figure S3. Phase fractions as a function of temperature obtained by Thermo-Calc calculations showing the coexistence of B2 FeAl and C14 Laves phase at a build temperature of 650 °C, marked by the arrow, for the Fe-25Al-1.5Ta alloy.

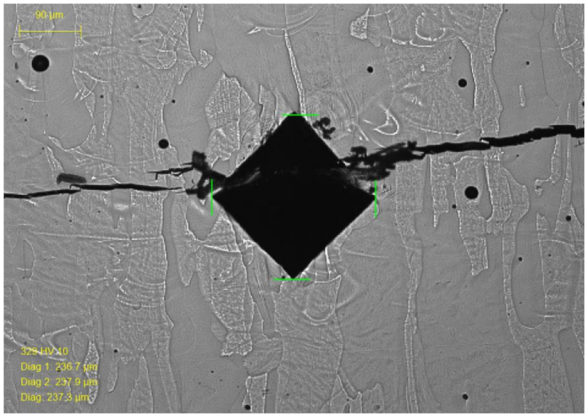


Figure S4. The hardness imprint of point number 25 in sample S2, showing a lower hardness of 329 HV10 due to micro-cracks and voids.

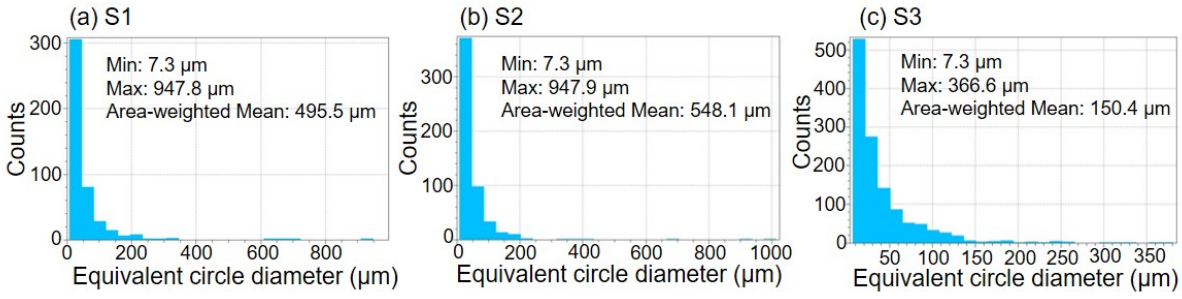


Figure S5. The grain size distributions for Samples S1 (a), S2 (b), and S3 (c). Individual grains were delineated using a misorientation threshold of 15°, and the grain size was quantified as the equivalent circle diameter (ECD).