

Mechanical Properties of 3-D PBF Printed Stainless Steel 316L Prototypes

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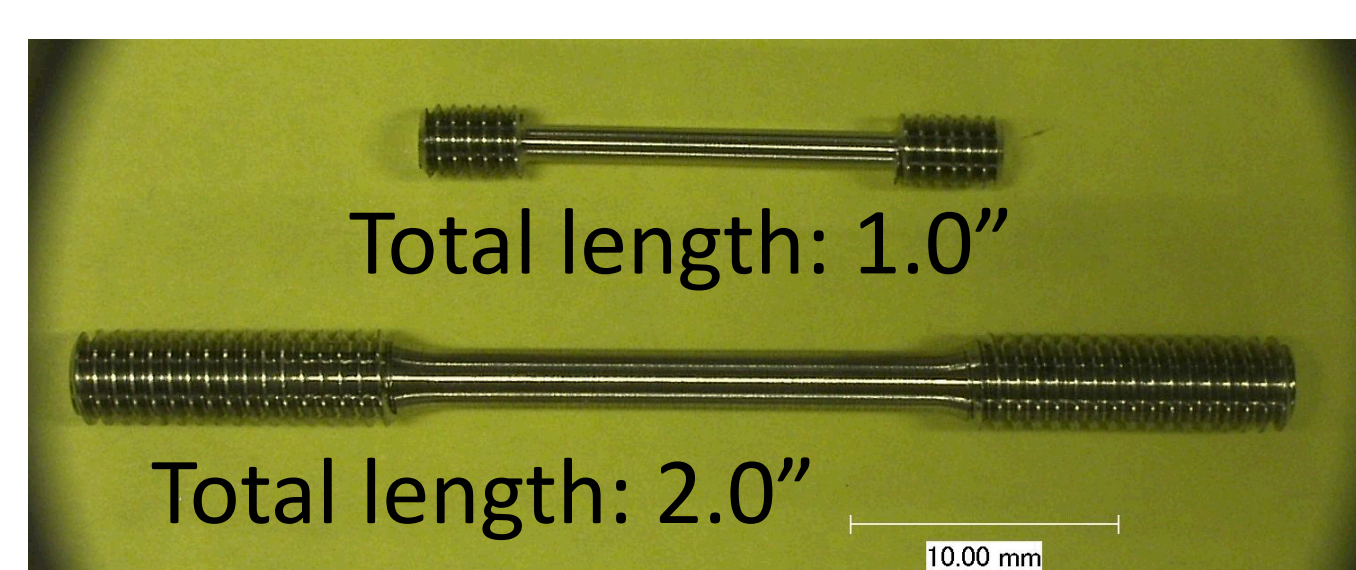
PBF SS 316L prototypes printed at SNL/CA

1. Cylinder (1"D x 2"H)
 2. 3-tier hexagon (2"x2")
- PBF machine ProX300

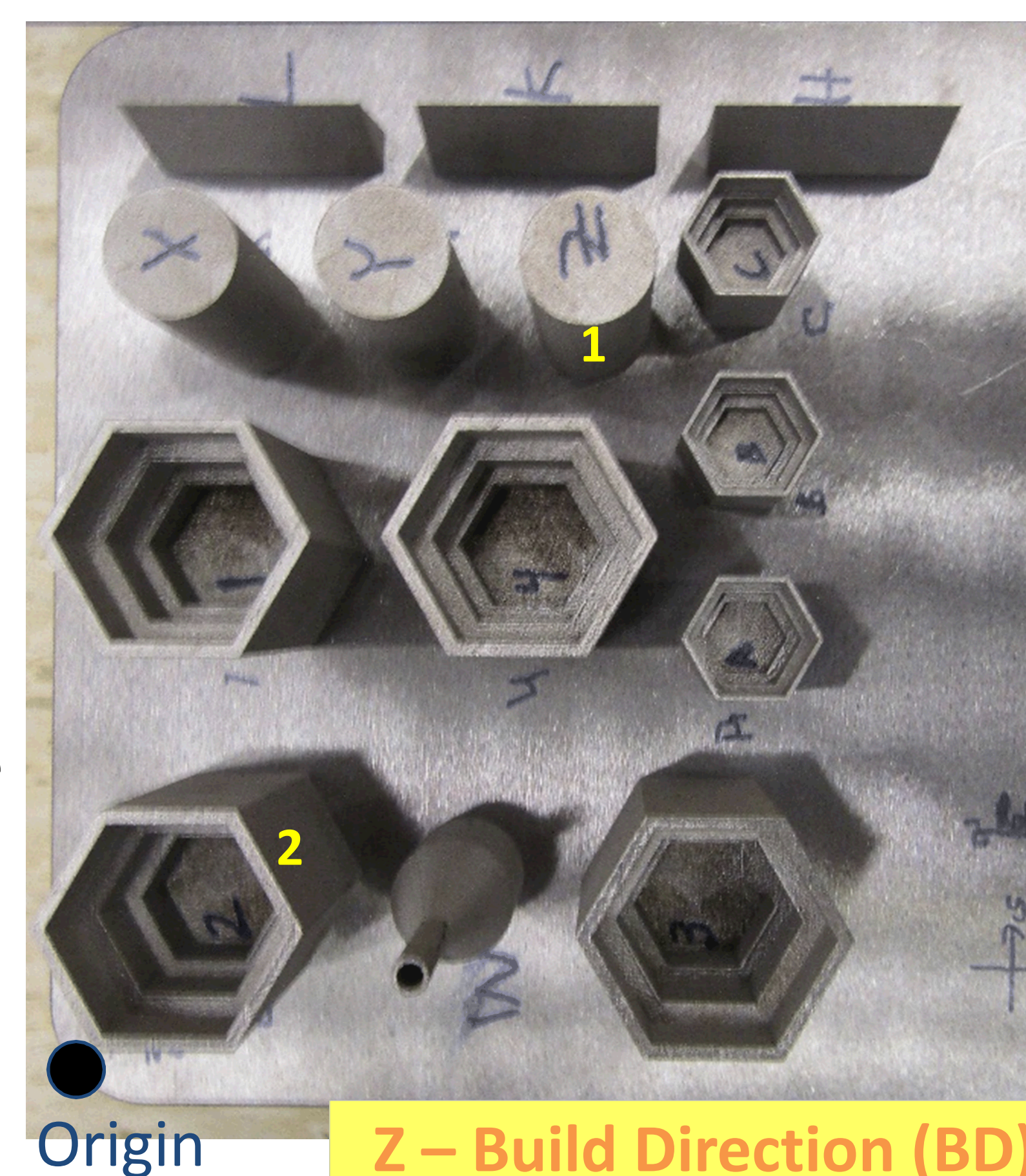
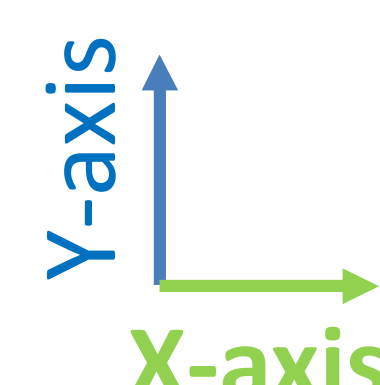
Processing parameters		
Laser power	Power layer thickness	Laser scan speed
41% (of 500W)	40 μm	200 mm/s

Tensile specimens

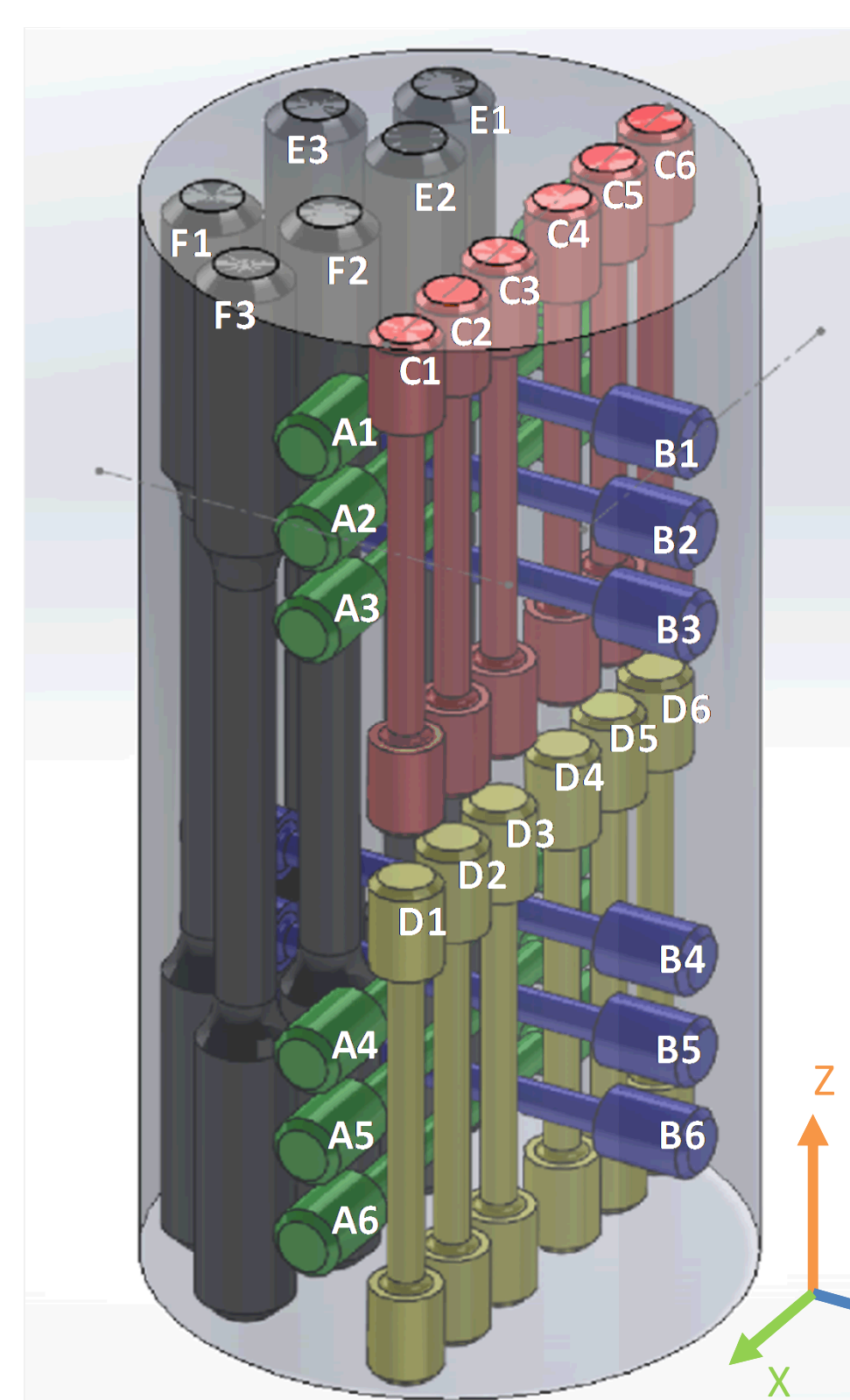
- Gage diameter: 0.06" or 0.10"



Reference Frame

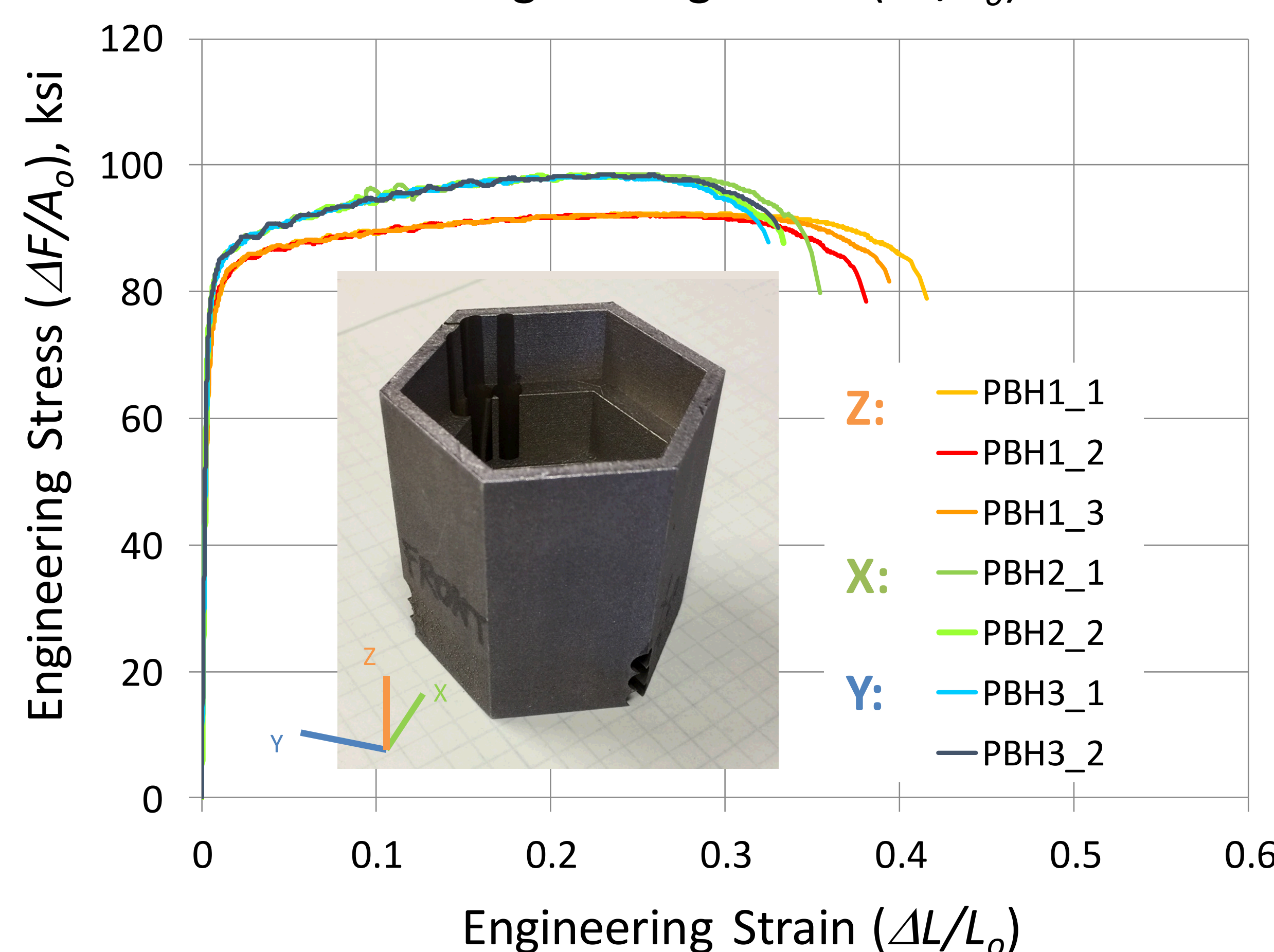
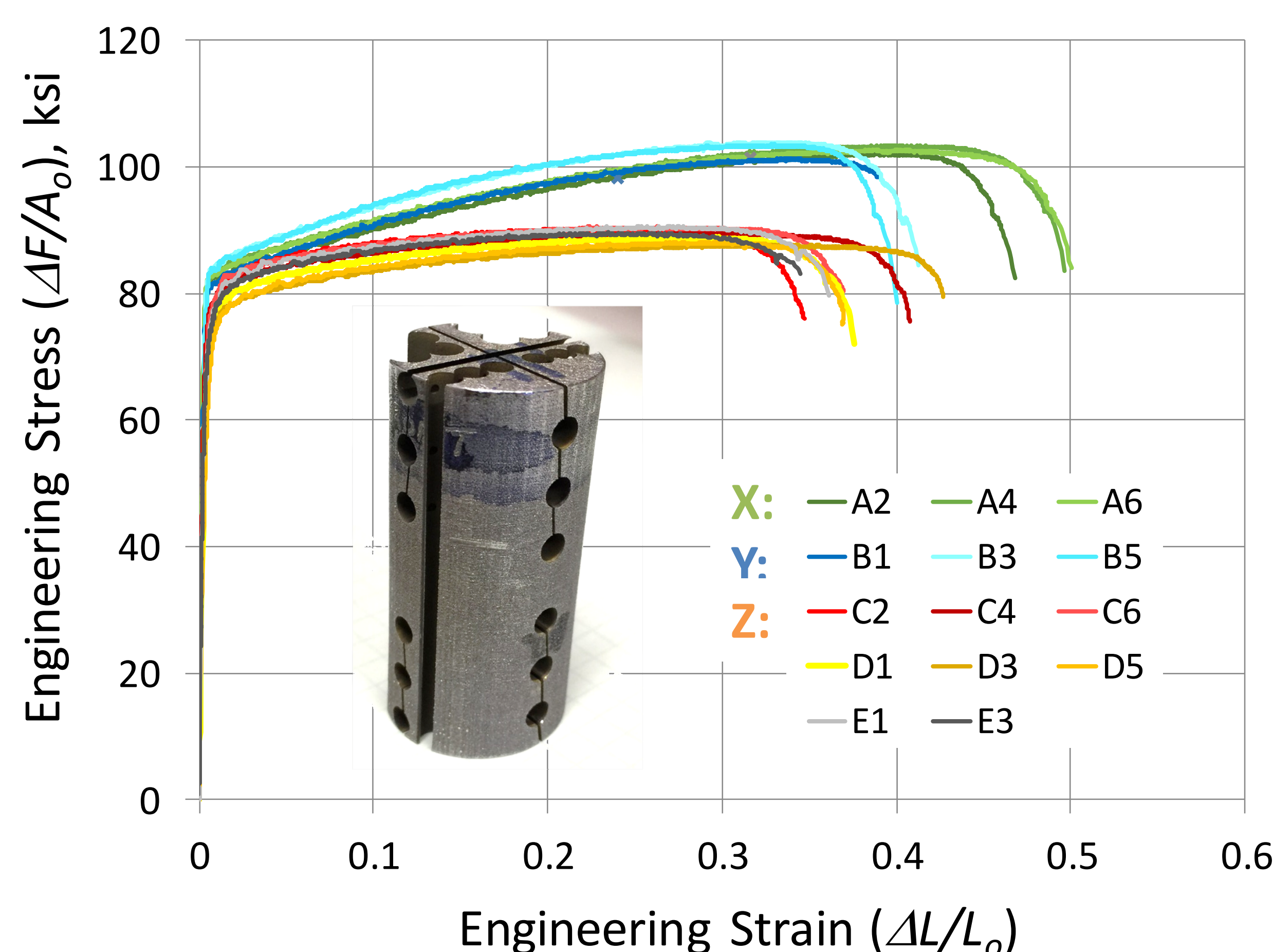


SS 316L tensile properties

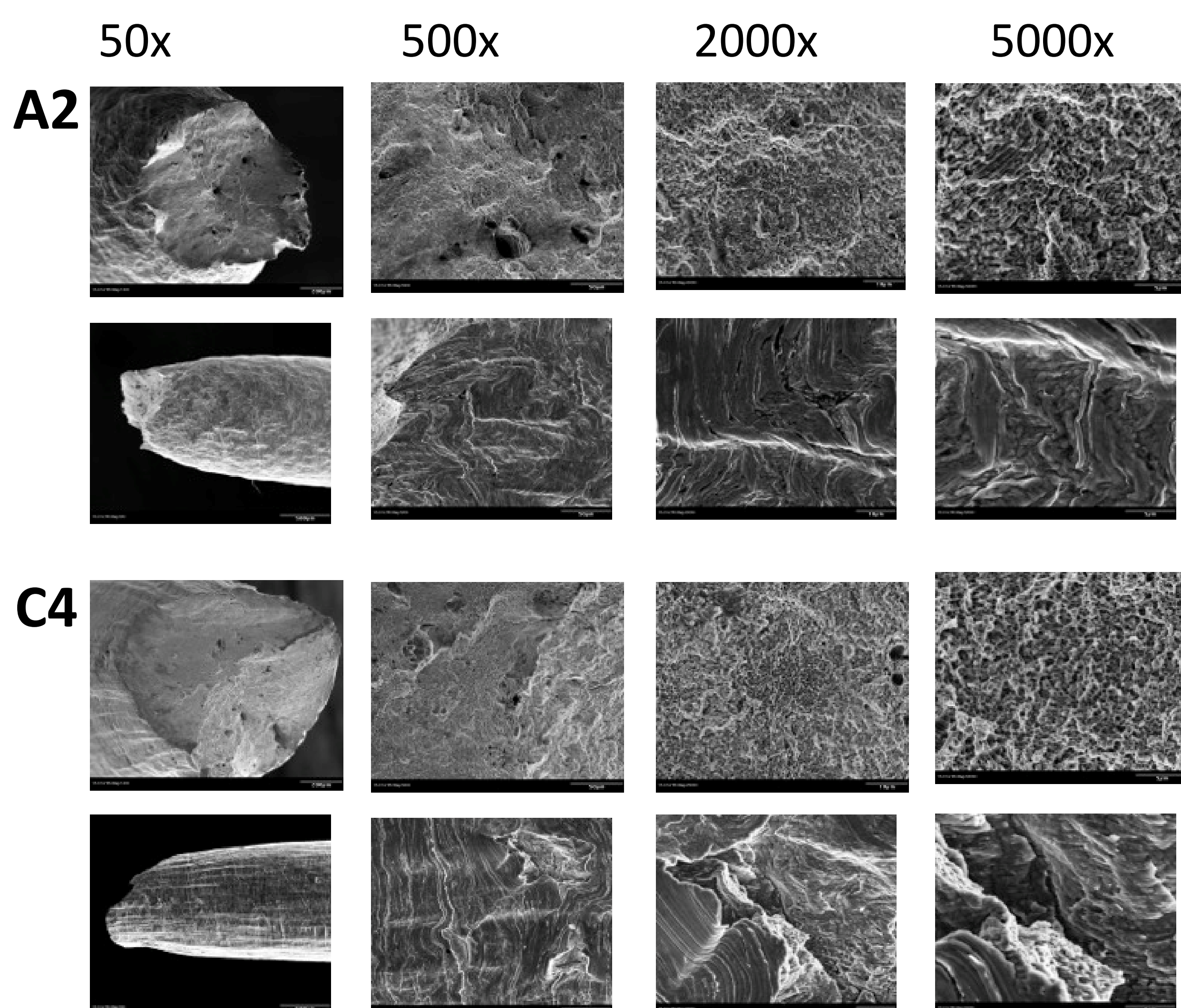


Specimen	Yield (ksi)	Strength (ksi)	Elongation (%)
2C	58	90	35
4C	74	90	41
6C	69	89	37
Average	67	90	37
1D	63	89	38
3D	62	88	43
5D	55	88	37
Average	60	88	39
1E	67	91	36
3E	68	90	35
Average	68	90	35
2A	79	102	47
4A	80	103	50
6A	82	103	50
Average	81	103	49
1B	80	101	39
3B	82	104	41
5B	81	104	40
Average	81	103	40
Typical*	25	70	40

*www.AZOM.com



Microstructural Analysis



Summary

- Material anisotropy
- Two different specimen sizes show consistent results