JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

HEA Hardness Measurements

ADAMaNT measurements of JHU Predictions

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Vickers Hardness

- Two samples were evaluated
  - Two indentation loads (300g and 500g)
  - 500g tests had significant deformation
- Some cracking (acceptable per ASTM C1327)
- Vickers Hardness calculated per ASTM C1327:

3.3.4 For the Vickers hardness test, in practice, test loads are in grams-force and indentation diagonals are in micrometers. The Vickers hardness number is calculated as follows:

$$HV = 1.000 \times 10^3 \times P/A_s = 2.000 \times 10^3 \times P\sin(\alpha/2)/d^2 \quad (6)$$

or

$$HV = 1854.4 \times P/d^2 \quad (7)$$

where:

P = force, gf,
A_s = surface area of the indentation, μm^2,
d = mean diagonal length of the indentation, µm, and
α = face angle of the indenter, 136° 0' (see Fig. 2).

Sample Name	Index	Al	Co	Cr	Cu	Fe	Nb	Ni	Si
EP5068B	27	0.167	0.167	0.167	0	0.167	0	0.167	0.167
EP5068C	254	0	0.111	0	0.111	0.111	0.556	0.111	0

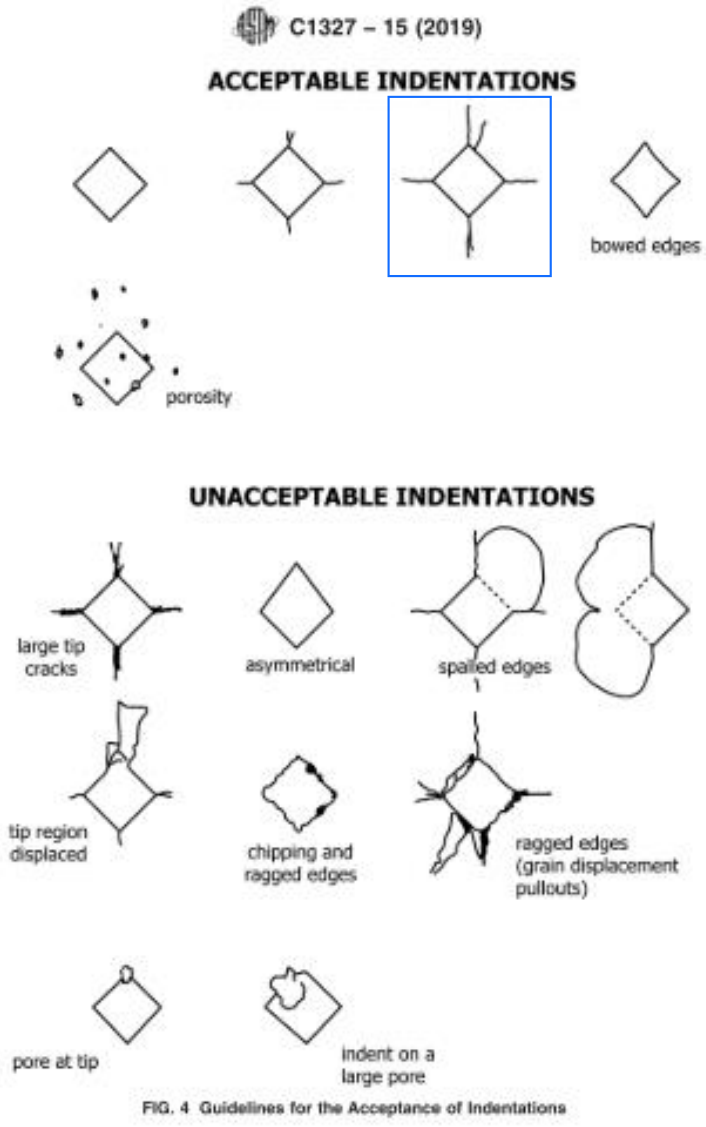
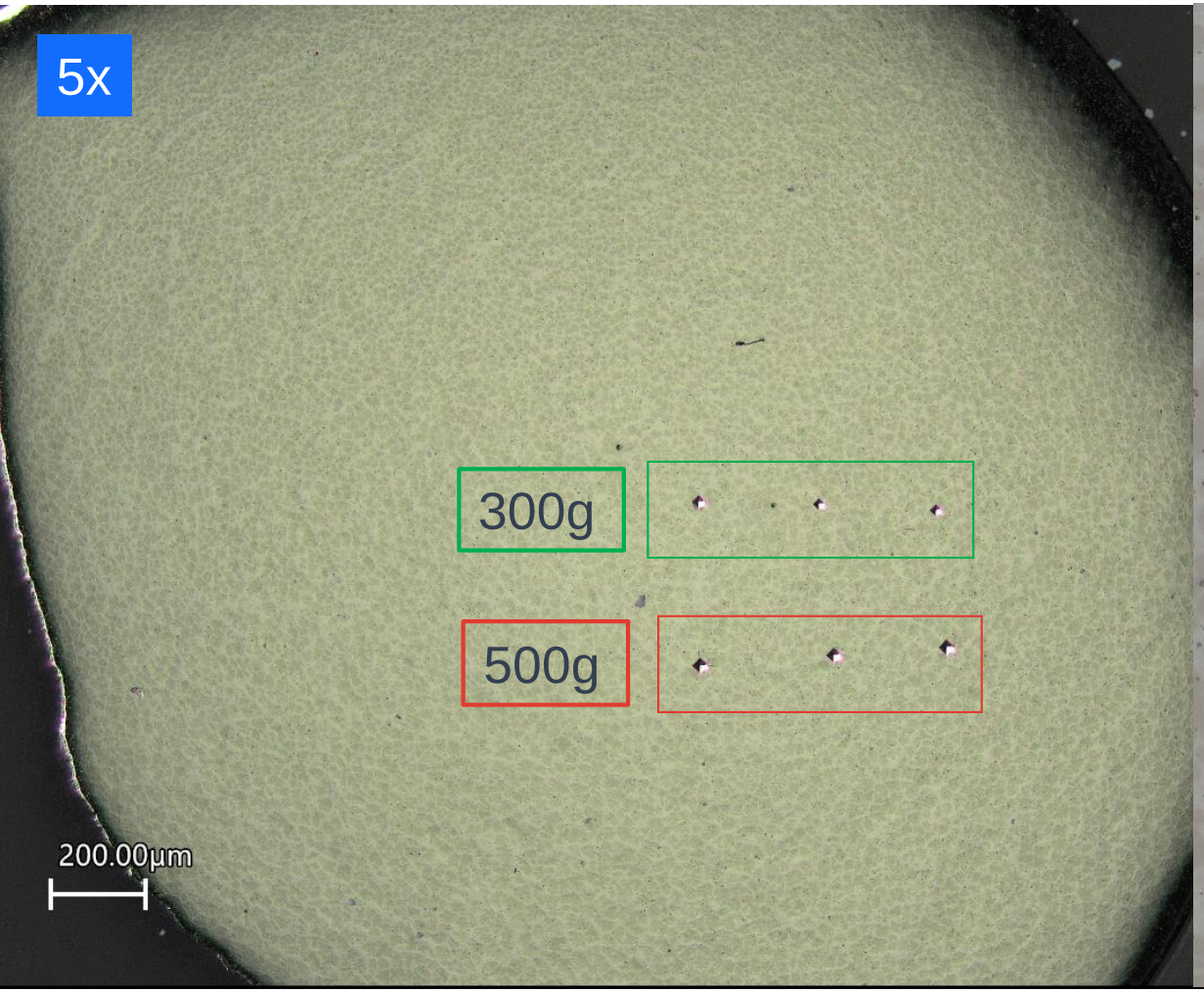


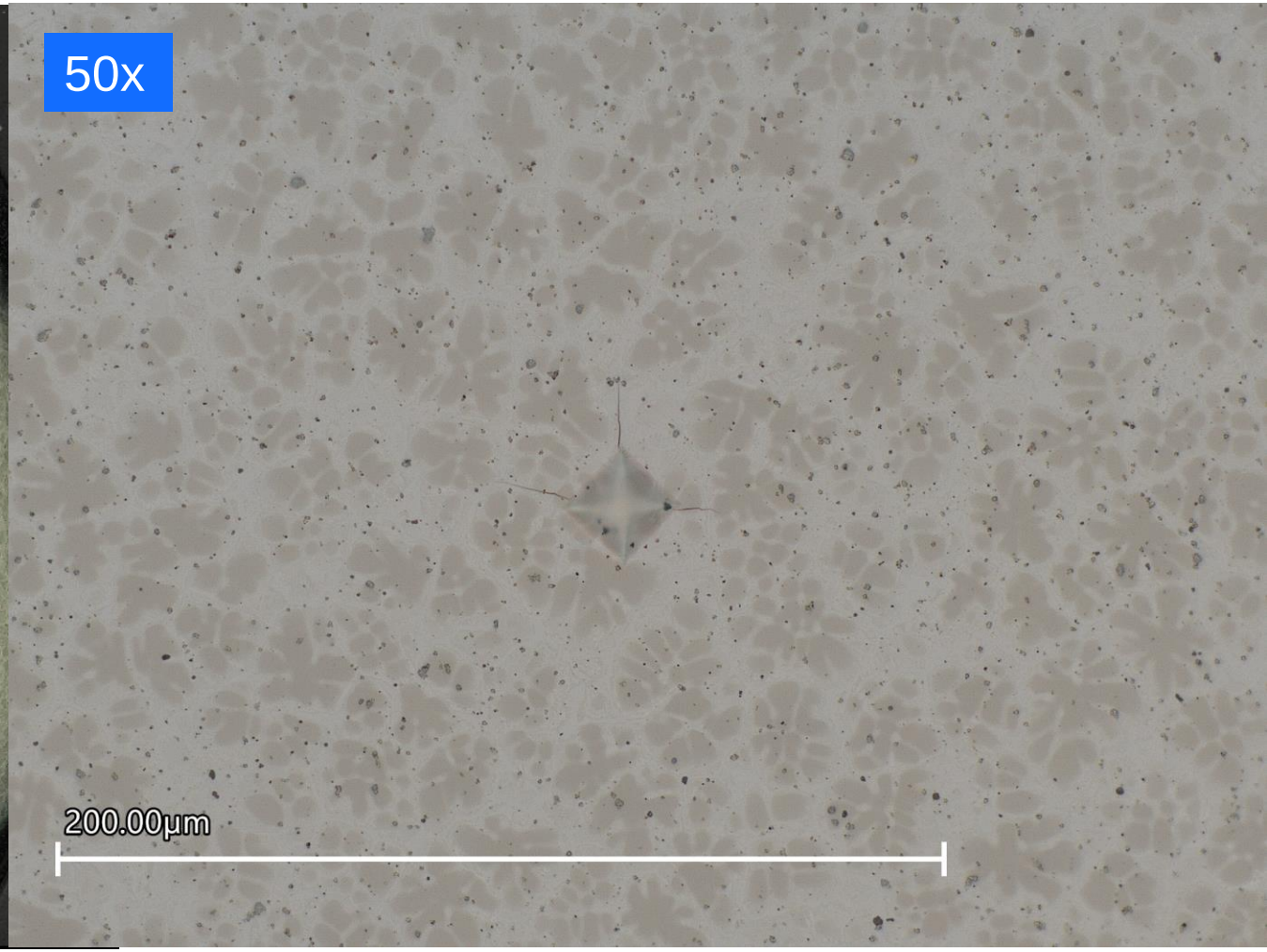
FIG. 4 Guidelines for the Acceptance of Indentations

Vickers Hardness Results

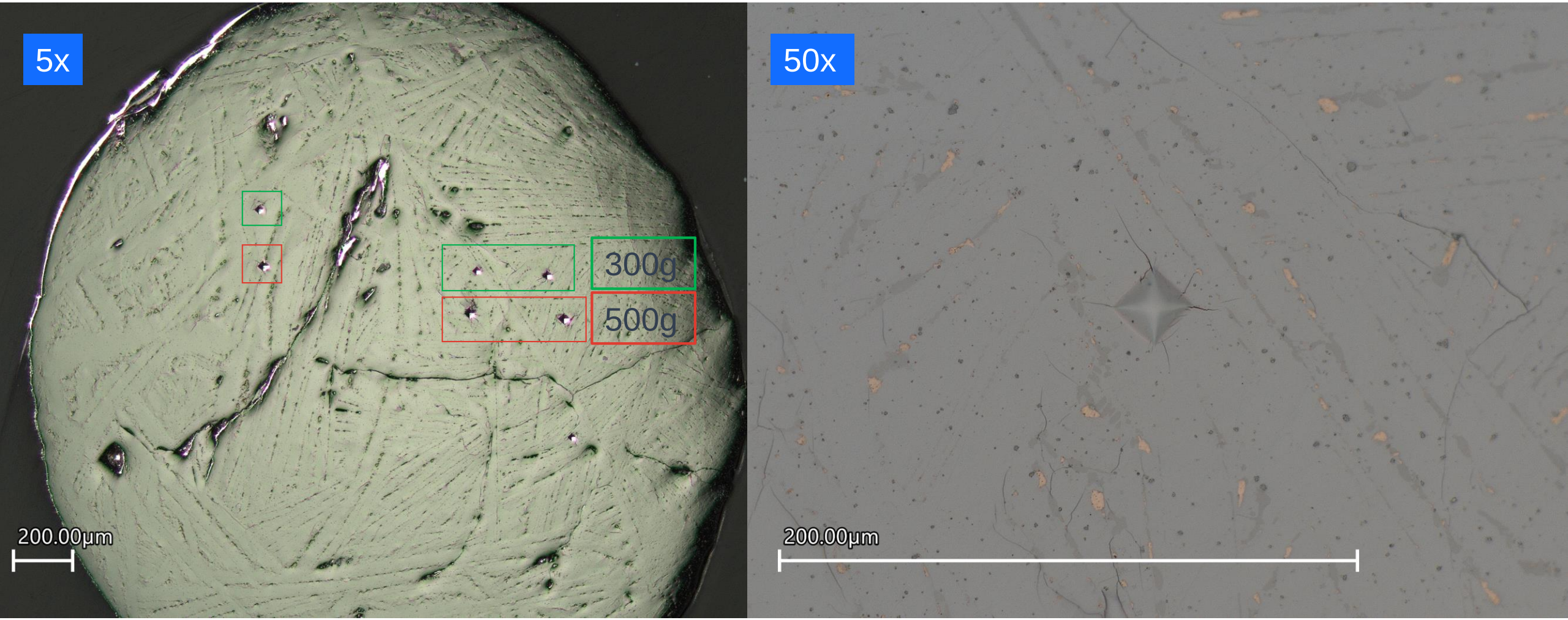
		d1 (um)	d2 (um)	Average D (um)	Force (g)	HV
EP5068B	Indent 1	27.3917	27.32005	27.35587	300	743
	Indent 2	23.81417	23.89892	23.85654	300	977
	Indent 3	25.38573	24.80807	25.0969	300	883
Index 27					**Average**	**868**
					Standard Deviation	96
					Recommended HV	733
EP5068C	Indent 1	30.46369	30.86467	30.66418	300	591
	Indent 2	28.01014	28.59371	28.30193	300	694
	Indent 3	31.0989	30.04945	30.57418	300	595
Index 254					**Average**	**627**
					Standard Deviation	47
					Recommended HV	763

EP5068B Indents and Microstucture





EP5068C Indents and Microstucture



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