

Model 1060 SEM Mill

Metal plan view sample preparation for electron backscatter diffraction analysis

Proper mechanical preparation of metal samples, followed by broad-beam argon ion milling, produces ideal sample surface characteristics for electron backscatter diffraction analysis.

Introduction

Electron backscatter diffraction (EBSD) is an analysis technique used to examine the crystallographic orientation of materials, including many metals. Preparing metallic samples first by mechanical methods, followed by broad-beam argon ion milling in the Fischione Model 1060 SEM Mill, yields sample surface characteristics ideal for EBSD analysis.

Mechanical preparation

Proper mechanical preparation will shorten the duration of ion milling operations.

1. Prepare a bulk or potted metallic sample.
2. If the sample is not coplanar, use a diamond saw to make the sample sides parallel.
3. Use an automated system or manual methods (for example, the Fischione Model 160 Specimen Grinder and a grinding wheel) to obtain a 1 μm surface finish.

Ion milling

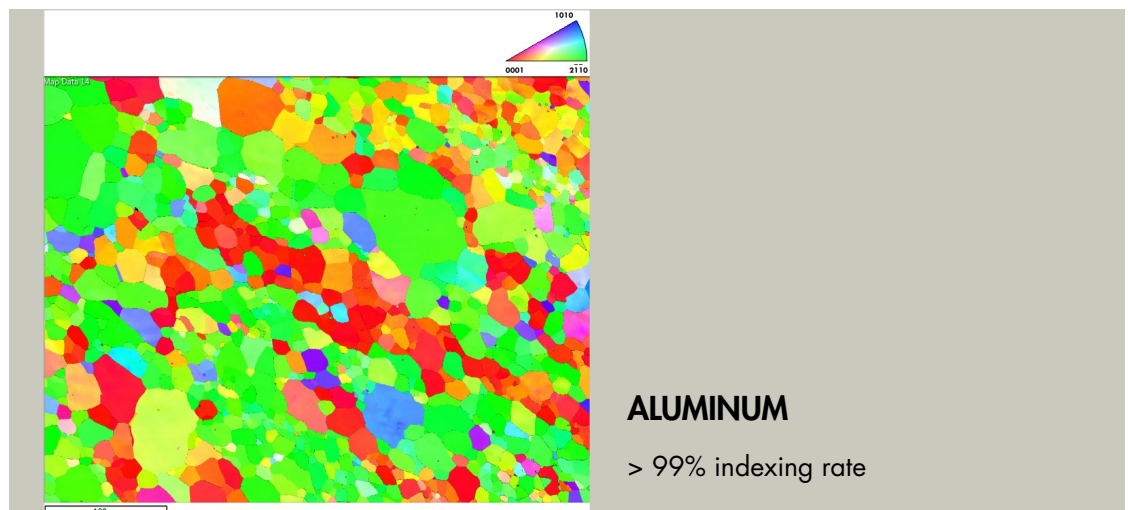
1. Mount the sample on an aluminum stub.
2. Insert the sample into the SEM Mill. The ion milling parameters will vary based on the sample material and its surface characteristics.

Suggested ion milling parameters

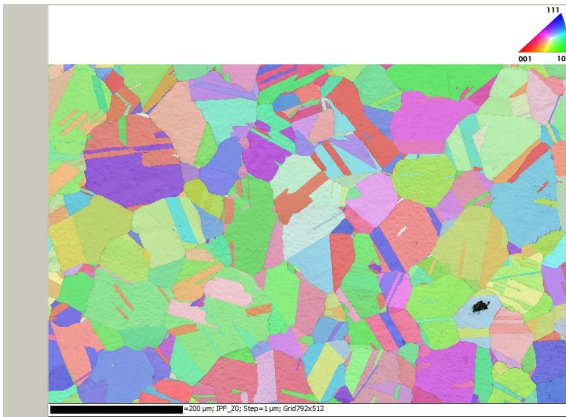
Parameter	Aluminum, brass, magnesium	Steel
Voltage	4 kV	5 kV
Focus	45%	45%
Beam angle	4°	4°
Rotation	360°	360°
RPM	3	3
Milling time	Two ion sources: 30 minutes One ion source: 1 hour	Two ion sources: 30 minutes One ion source: 1 hour

EBSD analysis

Following ion milling, the sample is ready for EBSD analysis.

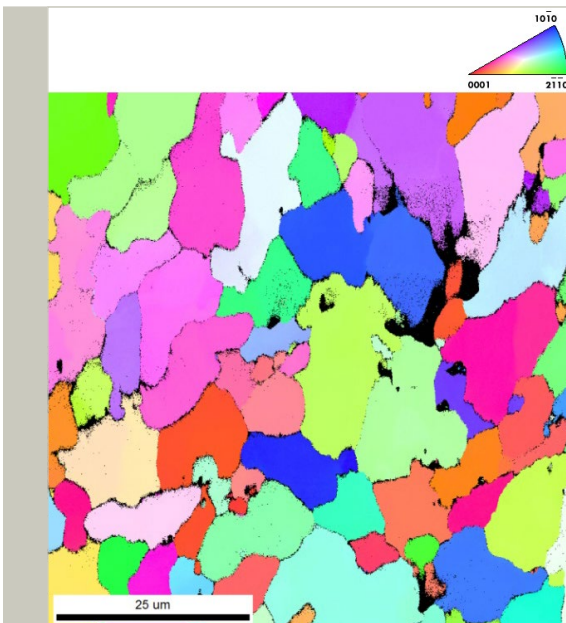


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BRASS

99.5% indexing rate



MAGNESIUM

Mg microstructure:
95% indexing rate

The porosity in the sample accounts for a significant portion of the non-indexed 5%.



STEEL

98% indexing rate



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