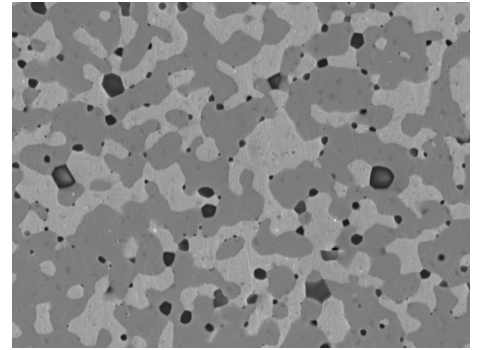


EXAM FIVE.



INTRODUCTION

The purpose of this exam is to give you a head start on the type of microstructural analysis you'll need to include in next week's paper. This is an open book, open notes, open web, **team-based** exam. You may work on this as much as you like, and start whenever you like. Complete the exam as a project team.

Submit one exam per project team to me via email (stolk@olin.edu) no later than **11:59 pm on Wednesday, April 1**. Please use Word format, pdf format, or a link to a google drive file. Estimated time required for this exam: 2 hours.

MICROSTRUCTURAL ANALYSIS

For this question, you are going to describe and interpret an alloy microstructure, connect the microstructure to measured or predicted properties.

1. Pick an optical or SEM micrograph to analyze. Select an image that is high quality and relevant to the questions you're trying to answer for this project.
 2. Insert the proper scale marker on your micrograph. For optical micrographs, the scale markers for each objective lens are available in a folder on the optical microscope computers. For the SEM, scale markers are included in the saved images.
 3. Create a micrograph label using the template shown on the next page. The micrograph label should include information on the type of microscopy, the etchant (if you used one), a detailed description of the microstructure, and a discussion of the measured or predicted properties for the microstructure. Include materials science theoretical support for both the microstructure description (e.g., phase diagrams, kinetics, thermodynamics, nucleation, growth), and for the property discussion (e.g., dislocations and strengthening mechanisms, electrical conductivity theory, chemical reactivity, etc.).
 4. Email an electronic version of your micrograph and label to Jon. Or, if you want to show off your awesome work, print a 16" x 20" (or so) sized poster of your micrograph, print your micrograph label separately, and hang both in the AC fourth floor hallway.
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Team Name

Team member names

Title of Your Micrograph

Composition of the alloy

Optical micrograph or scanning electron micrograph

Etchant or "as-polished"

Microstructure: Description of your microstructure, including the phases present, microconstituents (different regions of the microstructure), and notes on relevant structural features. For example, you may want to comment on the shape or color of different particles, the size of the grains, etc. Include materials science theory, as appropriate, e.g., information on phase diagrams, kinetics of phase transformations, nucleation and growth rates, chemical composition.

Properties: Discussion of the properties of the sample shown in this micrograph. You may describe the mechanical, electrical, corrosion, or whatever properties are appropriate to your project. Your description could be based on measured properties, e.g., strength or hardness or electrical resistivity, or your discussion could be based on expected/predicted properties for your microstructure. Support your property discussion with materials science theory, e.g., dislocations and strengthening mechanisms, fracture paths, conductivity in solids, chemical reactivity of solids, etc.