

**SIMSMC JUNE 2003**

**Module: THE POWER OF METAL IN THE ANDEAN WORLD/ Laboratory**

**METALLIC MICROSTRUCTURES: Castings**

There are 3 sets of etched samples for examination. Please study each specimen as indicated and answer the questions posed for each. In describing the microstructures, make whatever drawings are necessary to clarify your descriptions. All observations (notes and drawings) should be recorded in your laboratory notebook.

SET 1

SPECIMEN 231: 60.4 % Cu, 39.6 % Ag, as cast

Examine this section with the stereo microscope at a magnification of 7. You may need to rotate the mount to observe the structure. Do you see grains at this magnification? Describe the overall structure. Then examine the section with the metallurgical microscope. What is the evidence that this is a cast structure? Do you see grains or grain boundaries? If not, how can one tell where adjacent grains meet?

SPECIMEN TM-68: 90 % Cu, 10 % Sn, as cast

This specimen is best observed with the metallurgical microscope at a magnification of about 40–50. What is the evidence that this is a casting? In what way does the microstructure of TM-68 differ from that of 231? Describe the overall microstructure.

SET 2

SPECIMEN TM-70: 87 % Cu, 13 % Sn, as cast

SPECIMEN M-13: Tough pitch copper, chill cast

Examine both specimens with the metallurgical microscope for a sense of how varied dendritic structures can appear. Is there any evidence of microsegregation (coring) in either specimen? If so, describe its appearance.

SET 3

These three samples are alloys of copper and silver, in the cast condition.

SPECIMEN 229: 25.5% Cu, 74.5% Ag

SPECIMEN 230: 34.4% Cu, 65.5% Ag

SPECIMEN 231: 60.4% Cu, 39.6% Ag

Which of these alloys is a hypoeutectic alloy? Which is a hypereutectic alloy? What phase is represented by the dendrites in Specimen 229; what phase is represented by the dendrites in Specimen 230? Why are the dendrites in Specimens 229 and 230 different colors, since both samples were etched with the same etchant ( $\text{FeCl}_3$ )? What material surrounds the primary dendrites in all these samples (229, 230, 231)?