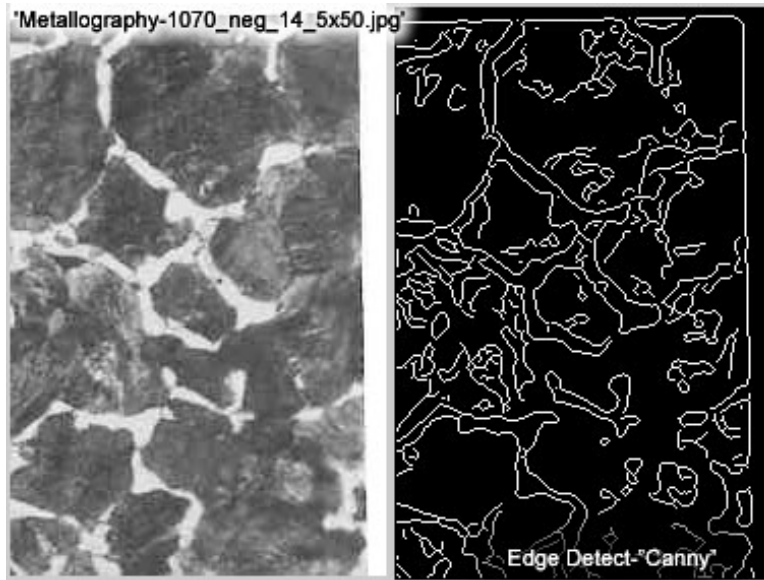


Non-Thesis Notes

May 11, 2003 - Sunday



```
G = imread('Metallography-1070_neg_14_5x50.jpg');  
T = rgb2gray(G);  
B = edge(T, 'canny'); % see above right figure
```

Prewitt edge Operation

Log Method



■ How will I perform boundary/region detection after edge detection is performed? It is noted that the edge detection algorithms can only go so far- as you see that the edges aren't *completely* connected.

The first assumption is that an interpolation method will need to be used to "connect" broken lines in the edges in order to form a border.



There are various methods:

- (1) Local Processing
- (2) Hough Global Processing
- (3) Global processing using Graph-Theoretic Techniques

Consider that the application may also require edge enhancement at some point. This can depend on the requirement for the "enhancing". Some literature discusses using a sharpening filter. However, I can anticipate increasing the 'thickness' of a line, by changing its neighbors to closely match the intensity of the discontinuity.

May 12, 2003 – Monday

Notes from today's meeting:

Inputs

- Chemistry of the alloy
- Polishing: mechanically or otherwise.
- Thermal processing
- Cold rolled

- Etched:
 - Grain boundaries
 - Colored images

- Illumination of the sample,
- **Isotropic/anisotropic**: Isotropic filters are rotation invariant, in the sense that rotating the image and then applying the filter gives the same result as applying the filter of the image first and then rotating.
 - In Metallurgical terms, it's having the same properties such as elasticity or conduction, in all directions**
- Interference – contrast light

Map that the student can use – 2nd phase particles

Manganese-sulfur: flat edges/flat faces > manganese sulfide -> Fuzzy Logic?

CCLI: Objectives from earlier submittals (from other projects) did not exactly meet the specs and were, thus, rejected.

Project will concentrate on the following materials in this order:

- (1) Steel
- (2) Aluminum
- (3) Brass
- (4) Bronzes
- (5) Titanium
- (6) Superalloys, etc...

From Alan's book, "Structure and Properties of Engineering Alloys" (Smith, 1981, McGraw-Hill), here are some common definitions:

Pearlite

Martensite

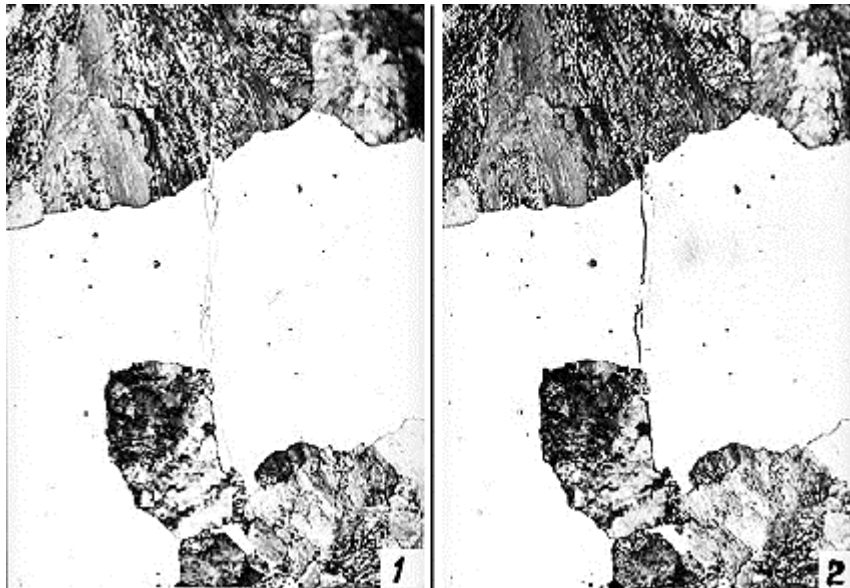
Austenitic: The solid solution of carbon in γ iron is designed austenite. It has a FCC crystal structure and a much greater solid solubility for carbon than α ferrite.

α **ferrite:** The solid solution of carbon in α iron is termed α ferrite, or simply ferrite.

FCC crystal structure:

Nucleation

Etching Methods and Effects



Micrograph 1 (and 2). Most etching reagents attack different phases with different rates and sharp steps will form at the phase boundaries. In the microscope they will show up as black lines. This micrograph is taken on an Fe-C alloy containing martensite, ferrite and cementite. Martensite is big white areas. A thin band of white ferrite is shown vertically. It has been attacked more than the martensite and is thus at a lower level. Thus the black contours. Cementite is found in a fine mixture with ferrite (so-called pearlite). Cementite is not at all attacked and should thus look white, also, but it is standing above the ferrite, which was attacked. The pearlite areas thus appear black when the lines cannot be resolved.

Micrograph 2. This micrograph is taken on the same area as picture 1 but with oblique illumination coming from the left. It is thus easy to see that the band of ferrite has been attacked more than the martensite.

Summary

- Edge Detection
- Edge Enhancement
- **Texture:** Regions of variation in brightness.

Links

Chapter 6 Electronic Structure at Grain Boundaries in Iron

<http://www-mp.phy.cam.ac.uk/people/vlad/Chapter6.html>

<http://www-mp.phy.cam.ac.uk/people/vlad/chapter1.html>