

★★★★★ FIVE STAR CHAPTER



The Materials  
Information Society

**Oak Ridge  
Chapter**

Thursday, October 22, 2009  
Oak Ridge Chapter of ASM International's  
*National Involvement Night*

## “Microstructures of Iron Meteorites”

**Frauke Hogue**  
*Hogue Metallography*

Less than 6% of all found meteorites are iron meteorites. They come from the core of asteroids (parent bodies), and are dislodged by impact. The size of meteorites varies significantly. The average size is not larger than a grain of fine sand and the largest known meteorite weighs 55 metric tons. The most common iron meteorites are octahedrites. The microstructure consists of varying distributions of the three phases, kamacite – ferrite, taenite – austenite, and plessite – a mixture of ferrite and austenite, with inclusions of sulfides, carbides and phosphides. All meteorites exhibit a Widmanstätten structure of interwoven kamacite and taenite. The structures of these ‘natural irons’ varies considerably from the ‘artificial’ or terrestrial irons we know. The cooling rates that produce these structures are very slow: 1 – 100 degrees every million years! Iron meteorites have been found on all continents. Examples of different classifications will be shown and the metallographic techniques used for identification of the phases will be discussed. Color etching is used extensively, producing attractive images that also convey scientific information.

### *Speaker Bio*

Frauke Hogue is a consultant metallographer in failure analysis. After graduating from the Lette Verein in Berlin, Germany, she came to the US and worked at an aerospace fastener manufacturing company in Los Angeles. At Voi-Shan she developed training materials and quality control procedures, and also worked closely with heat treating and manufacturing. In 1981, Frauke started to consult for corporate clients and independent laboratories, especially SEAL Laboratories, Los Angeles. The work involves training programs and all aspects of metallography for failure analysis of a wide range of materials, including electronics. In 1985, she was asked by ASM International to teach the Metallographic Techniques course at the headquarters in Cleveland. This assignment expanded to customized training courses in various companies. She received the Distinguished Educator Award in 1996 and the Instructor of Merit Award in 1997. Ms Hogue recognized the need for a course about the interpretation of microstructures that is based on the examination of actual samples. She developed this course, Practical Interpretation of Microstructures, which includes about 300 metallurgical samples, and has been teaching it since 1996. This year she developed a condensed version of the course to be presented in one day without the actual samples. Frauke has been a member of IMS since 1987, on the board of directors since 2000 and a member of ASM International since 1967. Currently she is president of IMS. Some of Frauke’s hobbies are traveling, hiking, color metallography and meteorites.

### **Registration (Guests Welcome!)**

Cost: \$20; Season pass: \$75

Students: Free if RSVP by Oct. 16<sup>th</sup>;  
\$5 if RSVP late

**RSVP by noon on Friday Oct. 16<sup>th</sup>**

Contact: Jun Qu

(865)-576-9304 or qujn@ornl.gov

### **Rothchild’s Conference Center**

8807 Kingston Pike  
(865) 690-0103

Thursday, October 22<sup>nd</sup>  
Schedule

5:30 pm– Social Hour

6:30 pm– Dinner

7:30 pm– Talk

Thursday, October 22, 2009  
Oak Ridge Chapter of ASM International  
Presents a Short Course on

## “Interpretation of Microstructures”

**Frauke Hogue**

*Hogue Metallography  
Course Description*



Do you interpret microstructures on a regular basis, for quality control, failure analysis or research? Are you just curious about what the structures mean that you have been seeing all these years? Or is metallography a new field for you? In any case, this short course is for you! It is a half-day version of the 5-day class that has been presented to rave reviews at the ASM Headquarters in Materials Park, Ohio, for the past ten years. The focus is on practical interpretation (NOT theory), phase diagrams, and thermodynamics. There are no prerequisites. We will look at slides of microstructures and find out and discuss what each structure tells us about the type of material, manufacturing methods used, heat treatment, mechanical properties, and sometimes even failure modes.

The class is divided into several segments including:

- Basic Structures – illustrating the correct terminology used to describe structures, such as IGC, equiaxed, cold worked, coring, sliplines, etc.
- Carbon & Alloy Steels – learn to identify untempered martensite, retained austenite, bainite, influence of cooling rates, and heat treatment on microstructures
- Cast Irons & Tool Steels – determine graphite morphology, primary carbide distribution
- Stainless Steels – ferritic, martensitic, austenitic, duplex, and precipitation hardening stainless steel structures, sensitization, delta ferrite, wrought, and cast materials.

All discussed structures are illustrated with annotated slides. Each participant receives a notebook with printed slides to facilitate additional note taking.

### **Course Registration**

Cost: \$50 for members

Students: \$10

**Note: Dinner cost for the technical meeting at Rothchild's later that evening is included for attendees.**

### **RSVP by COB, Oct. 16<sup>th</sup>**

Contact: Jun Qu

(865)-576-9304 or [qujn@ornl.gov](mailto:qujn@ornl.gov)

### **Course Location**

**ORAU's Center for Science Education's Classroom.**

Directions: Directly behind the Enrichment (formerly K-25) Federal Credit Union building off Illinois Avenue and west of the Doubletree Hotel.

### **Schedule**

**12:30 – 4:30 pm**

Oak Ridge Chapter of ASM International  
2009-2010 Technical Calendar

**MARK YOUR CALENDAR !**

**November 19<sup>th</sup>:** Student Poster Night  
@ Rothchild Catering Center

**January 21<sup>st</sup>:** Guest Night  
Peter J. Blau  
“The Nature of Friction: From nano-films to earthquakes”  
@ Rothchild Catering Center

**February 18<sup>th</sup>:** Industry Night

**March 25<sup>th</sup>:** Past Chair’s Night  
Ann Marie Sastry – tentative  
Topic: Advanced Battery Storage  
@ Rothchild Catering Center

**April TBA:** Educational Symposium

**May 20<sup>th</sup>:** Awards Night  
Rogelio Sullivan - tentative  
“Future Renewable Electric Energy Delivery and Management”  
@ Rothchild Catering Center