

Readings for G777 – Fall 2010

For most week's class there are supplemental articles, some from the recent literature. Starting with Week 3, students will be responsible for leading discussions based on the materia. I ask that each person pick 5 papers from the list marked **, in rank order preferred. There is a wide range of page lengths, and I will try to balance this. **Those without those marks will be discussed by me and will be included on the weekly quizzes. And once I have picked the papers students will be responsible for, a revised listing which everyone is responsible for reading, will be distributed.**

The articles should all be available on the 777 web page. There they are sorted by journal, so first go to the journal heading.

Week 1 (Introduction; Electron-sample interactions)

Hillier 1989 Electron microscopy to electron microprobe analysis: the early years: Microbeam Analysis (annual meeting), p. 1-3

Week 2 (Electron-optical column; vacuum)

Chapman 1999 Optimizing the performance of a tungsten hairpin SEM: Scanning Microscopy, Vol 13, p. 141-146

Buonaquisti 1993 If you hate vacuum systems, read on; and Why pressure scales cause so much confusion: Microscopy Today, February and December (2 pp)

Week 3 Image Acquisition; CL

**Ginibre, Kronz and Worner, 2002, High-resolution quantitative imaging of plagioclase compositions using accumulated BSE images, Contributions Min Pet, vol. 142, pp. 436-448

Week 4 (EDS)

Lund 1994-95 More than one ever wanted to know about x-ray detectors: Part 1-First in series; Part 2-Settling the question of detector warming; Part 3-Who put Pm in my soup?; Part 4-Windows for elements heavy and light; Microscopy Today, 3 pp.

Ritchie et al 2008 DTSA-II: a new tool for simulating and quantifying EDS spectra. Microscopy & Microanalysis 14 (Suppl 2), pl 1176-1177.

Week 5 VPSEM and Low Voltage SEM

**Newbury 2002 X-ray microanalysis in the VP-SEM, J. of Research of NIST, vol. 107, p. 567-603.

**Newbury 2002 Barriers to quantitative electron probe x-ray microanalysis for low voltage SEM, J. of Research of NIST, v. 107, p. 605-619.

Week 6 Advanced SEM and EDS

**Newbury 2005 Misidentification of major constituents by automatic qualitative EDS, Microscopy and Microanalysis, Vol 11, p. 545-561

**Response and rebuttal: Burgess and Newbury: Microscopy & Microanalysis vol 12, p. 281-284.

**Watt et al 2000 Charge contrast imaging in geological materials in ESEM, American Mineralogist, vol. 85, p. 1784-1794.

**Cuthbert and Buckman 2005 Charge contrast imaging of fine-scale microstructure and compositional variation in garnet using the ESEM, American Mineralogist, vol. 90, p. 701-707

Week 7 WDS Part 1

Lund 1995 Part 5-Wavelength, the “other” spectroscopy; *Microscopy Today*, 1 pp.
Castaing and Guinier 1953 Point-by-point chemical analysis by x-ray spectroscopy (and Introduction to Symposium): *Analytical Chemistry*, Vol 25, 4 pp.

**Remond et al 2002 Decomposition of wavelength dispersive x-ray spectra, *J of Research of NIST*, Vol 107, p. 509-529.

Week 8 (WDS Part 2)

**Staub 2006 Low energy X-ray spectrometry technique as applied to semiconductors, *Microscopy and Microanalysis*, Vol. 12, p. 340-346.

Week 9 Quantitation; Matrix Correction (~ZAF)

**Joy 2001 Fundamental constants for quantitative X-ray microanalysis, *Microscopy and Microanalysis*, vol 7, p. 159-167

Week 10 Standards; Specimen Preparation

Jarosowich 2002 Smithsonian Microbeam Standards, *J. of Research of NIST*, v. 107, p. 681-685

**Carpenter 2008 EPMA standards: the good, the bad and the ugly. *Microscopy & Microanalysis* 14 (Suppl 2), pl 530-531.

Rose 2008 Smithsonian Microbeam Standards: not just our farher’s microprobe standards. *Microscopy & Microanalysis* 14 (Suppl 2), p. 528-529

Vincenzi and Rose 2008 Hyperspectral X-ray analysis of submicrometer-scale heterogeneities in a venerable compositional standard: Kakanui hornblende. *Microscopy & Microanalysis* 14 (Suppl 2), p. 522-523.

**Windsor et al 2002 Copper oxide precipitates in Standard Reference Material 482, *J. of Research of NIST*, v. 107, p. 663-679.

**Remond et al 2002 Implications of polishing techniques in quantitative x-ray microanalysis, *J. of Research of NIST*, v. 107, pl. 639-662.

Week 11 Trace Elements

**Carpenter et al 2002 Characterization of Corning EPMA standard glasses 95IRV, 95IRW, and 95IRX, *J. of Research of NIST*, v. 107, p. 693-701

**Jercinovic et al 2005 Analytical perils (and progress) in electron microprobe trace element analysis applied to geochronology, *American Mineralogist*, vol. 90, p. 526-546.

** Newbury 2009 Mistakes encountered during automatic peak ID of minor and trace constituents in electron-excited EDS microanalysis, *Scanning*, v. 31, p. 91-101.

Week 12 Light Elements; Thin Films and Particles

**Pouchou 1993 X-ray microanalysis of stratified specimens, *Analytica Chimica Acta*, Vol. 283, p. 81-97.

**Small 2002 The analysis of particles at low accelerating voltage (<10 kV) with EDS, *J. of Research of NIST*, v. 107, p. 555-566.

Week 13 Difficult/sensitive materials

** Morgan and London (1996): Optimizing the electron microprobe analysis of hydrous alkali aluminosilicate glasses. *American Mineralogist*, v. 81, p. 1176-1185.

** Stormer et al (1993): Variation of F and Cl X-ray intensity due to anisotropic diffusion in apatite during electron microprobe analysis. *American Mineralogist*, v. 78, p. 641-648 (also appendix)

- **Friel and Lyman 2006 X-ray mapping in electron-beam instruments, *Microscopy and Microanalysis*, Vol 12, p. 2-25.
- **Newbury 2006 The new X-ray mapping: x-ray spectrum imaging above 100 kHz output count rate with the silicon drift detector, *Microscopy and Microanalysis*, Vol 12, p. 26-35.

Week 14 Accuracy and Errors

- **Lifshin and Gauvin 2002 Minimizing errors in electron microprobe analysis, *Microscopy and Microanalysis*, Vol. 7, p. 168-177.
- **Llovet and Galan (2003) Correction of secondary X-ray fluorescence near grain boundaries in electron microprobe analysis: Application to thermobarometry of spinel lherzolites. *American Mineralogist*, v. 88, p. 121-130.

Week 14 EBSD

- Prior et al (1999) The application of electron backscatter diffraction and orientation contrast imaging in the SEM to textural problems in rocks, *American Mineralogist*, 84, 1741-1759.
- Prior et al (1996) Orientation contrast imaging of microstructures in rocks using backscatter detectors in the SEM, *Mineralogical Magazine*, 60, 859-869.

Other papers:

- MacRae and Wilson 2008 Luminescence database I-Minerals and materials, *Microscopy and Microanalysis*, Vol 14, p. 184-204 (12.5 pages are a table)
- Gauvin et al 2006 Win X-ray: A new Monte Carlo program that computes x-ray spectra obtained with a SEM, *Microscopy and Microanalysis* Vol 12, p. 49-64
- Lamontagne et al 2007 Microbeam analysis of irradiated materials, *Microscopy and Microanalysis*, Vol 13, p. 150-155.
- Kotula et al 2006 Tomographic spectral imaging with multivariate statistical analysis: comprehensive ED microanalysis, *Microscopy and Microanalysis*, Vol. 12, p. 36-48.
- Dellith and Wendt 2007 The M emission spectrum of Erbium, *Microscopy and Microanalysis*, Vol 13, p. 191-195.
- Humphreys et al (2006), SIMS investigation of electron-beam damage to hydrous, rhyolitic glasses: Implications for melt inclusion analysis. *American Mineralogist*, 91, 667-679.
- Gotze (2002): Potential of cathodoluminescence (CL) microscopy and spectroscopy for the analysis of minerals and materials (*Anal Bioanal Chem*, v. 374, p. 703)

And others are listed at

www.geology.wisc.edu/~johnf/g777/777articles.html. If you see something there not listed here, ask me if it might be acceptable.

Version
8/28/010