

Readings for G777

For each week's class there are supplemental articles, some from the recent literature. Starting with Week 5, students will be responsible for leading discussions based on the material. I ask that each person pick 5 papers in rank order preferred. There is a wide range of page lengths, and I will try to balance this. These are the articles marked **. Those without those marks will be discussed by me/woven into the lecture.

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

Castaing and Guinier 1953 Point-by-point chemical analysis by x-ray spectroscopy (and Introduction to Symposium): Analytical Chemistry, Vol 25, 4 pp.

Joy 1991 An introduction to Monte Carlo simulations: Scanning Microscopy, Vol 5, p. 329-337 (background for the use of several Monte Carlo programs you will be doing as exercises)

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 (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.

Week 4 (WDS Part 1)

Lund 1995 Part 5-Wavelength, the "other" spectroscopy; Microscopy Today, 1 pp.

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

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 (WDS Part 2)

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

Dellith and Wendt 2007 The M emission spectrum of Erbium, Microscopy and Microanalysis, Vol 13, p. 191-195.

Week 6 Quantitation; Matrix Correction (~ZAF)

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

**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.

Week 7 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 father'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 8 Accuracy and Precision

- **Lifshin and Gauvin 2002 Minimizing errors in electron microprobe analysis, Microscopy and Microanalysis, Vol. 7, p. 168-177.
- **Alvisi et al 2006 The determination of the efficiency of energy dispersive x-ray spectrometers by a new reference material, Microscopy and Microanalysis, Vol. 12, p. 406-415.

Week 9 Imaging

- **Friel and Lyman 2006 X-ray mapping in electron-beam instruments, Microscopy and Microanalysis, Vol 12, p. 2-25.

Week 10 ESEM/VPSEM; 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.
- **Staub 2006 Low energy X-ray spectrometry technique as applied to semiconductors, Microscopy and Microanalysis, Vol. 12, p. 340-346.

Week 11 CL; other imaging techniques; spectral imaging

- MacRae and Wilson 2008 Luminescence database I-Minerals and materials, Microscopy and Microanalysis, Vol 14, p. 184-204 (12.5 pages are a table)
- **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
- **Kotula et al 2006 Tomographic spectral imaging with multivariate statistical analysis: comprehensive #D microanalysis, Microscopy and Microanalysis, Vol. 12, p. 36-48.

Week 12 Light elements; thin films; 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.

Robaut et al 2006 Practical aspects of carbon content determination in carburized steels by EPMA, Microscopy and Microanalysis, Vol 12, p 331-334

Week 13 Trace elements; tricky samples

**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.

**Lamontagne et al 2007 Microbeam analysis of irradiated materials, Microscopy and Microanalysis, Vol 13, p. 150-155.

Week 14 EBSD

**Prior et al 1999 The application of ebsd and orientation contrast imaging in the SEM to textural problems in rocks, American Mineralogist, vol. 84, p. 1741-1759.

**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 15 TBD

**Trincavelli et al 2008 Experimental method to determine the absolute efficiency curve of a wavelength dispersive spectrometer, Microscopy and Microanalysis, Vol 14, p. 306-314.

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