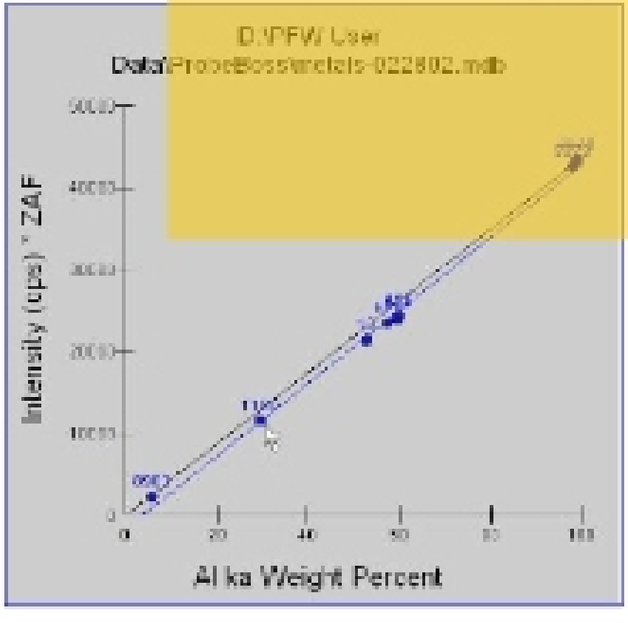
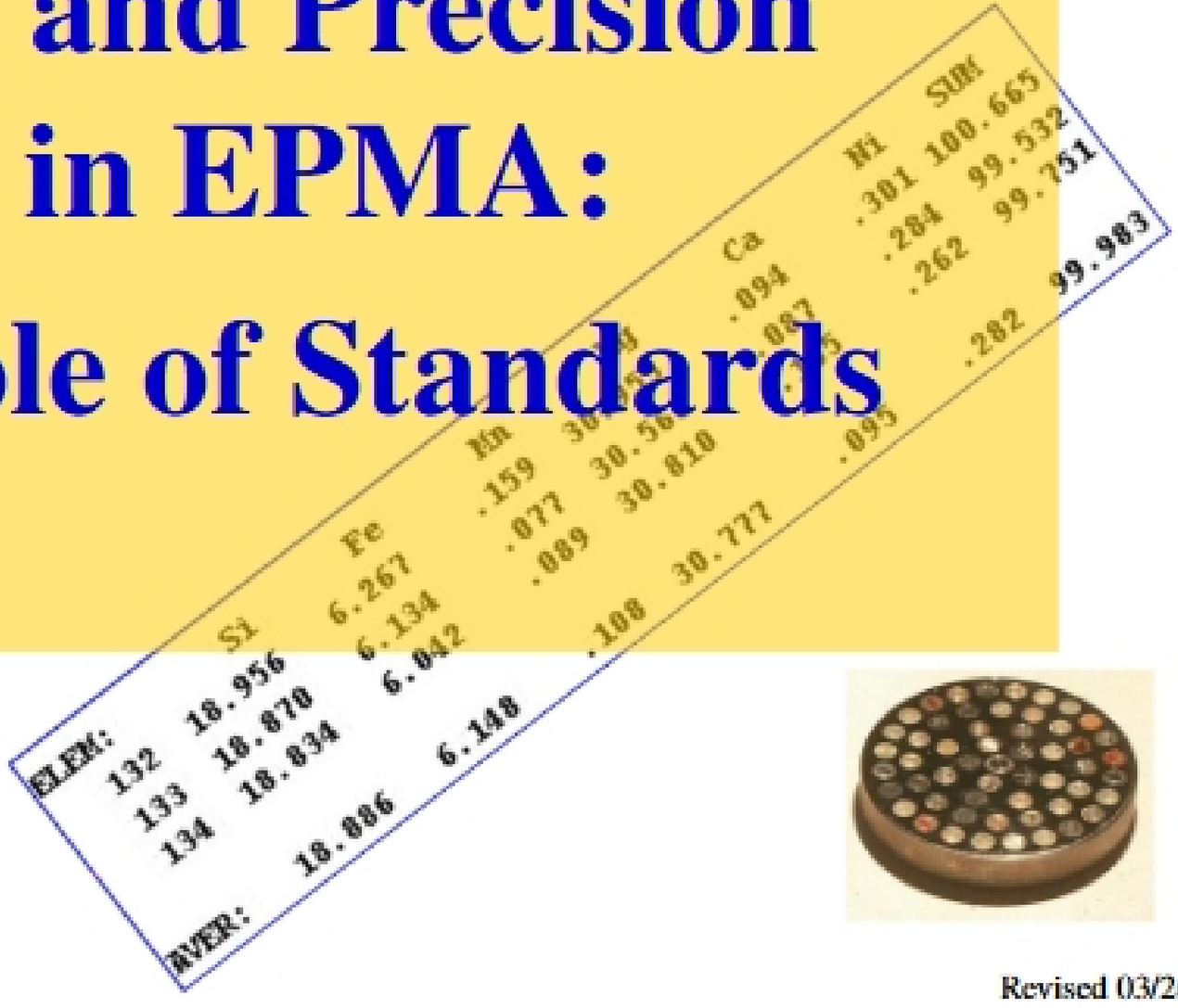
Electron probe microanalysis

Accuracy and Precision in EPMA: The Role of Standards





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What's the point?

EPMA's claim to fame as a microanalytical tool rests upon (1) faith in a correct matrix correction and (2) use of "good", "correct", "true" standards.

How do you know to trust a standard?

Standards

In practice, we hope we can start out using the "best" standard we have.* There have been 2 schools of thought as to what is the "best" standard is:

- a pure element, or oxide, or simple compound, that is pure and whose composition is well defined. Examples would be Si or MgO or ThF_4. The emphasis is upon accuracy of the reference composition.

- a material that is very close in composition to the unknown specimen being analyzed, e.g. silicate mineral or glass; it should be **homogeneous** and **characterized chemically**, by some suitable chemical technique (could be by EPMA using other trusted standards). The emphasis here is upon having a matrix that is similar to the unknown, so that (1) any potential problem with the matrix correction will be minimized, and (2) any specimen specific issues (i.e. element diffusion, volatilization, sub-surface charging) will be similar in both standard and unknown, and largely cancel out.

* This is based upon experience, be it from prior probe usage, from a more experienced user, from a book or article, or trial and error (experience comes from making mistakes!) It is commonly a multiple iteration, hopefully not more than 2-3 efforts.