IUVSTA Short Course on Secondary Ion Mass Spectrometry

"The meaning of SIMS and how to collect useful data"

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Secondary Ion Mass Spectrometry is undoubtedly one of the most powerful analytical methods for understanding surfaces, thin films and nanostructures. However, despite major advances in recent years, the uptake of SIMS outside the expert community has been rather slow. The reasons for this are obvious: SIMS data are difficult to understand, hard to quantify and the results *appear* to vary depending on where data was acquired, who acquired it and when they did it. In actuality, SIMS is very consistent and is both blessed and cursed with amazing sensitivity to changes in composition, structure and experimental conditions. Some of these dependencies are understood, some are being unravelled and others still require attention. This tutorial will explore, highlight and discuss the most important factors to consider in performing a SIMS experiment to produce meaningful, useful and comparable data. The course material will be based upon exemplary papers and data, international standards, interlaboratory comparisons, and both the observations and ~~many mistakes~~ experience of the tutor.

In each topic in the tutorial, current knowledge and best practice will be described as well as controversial views in areas of uncertainty, this will be followed by an interactive discussion on practical challenges, useful strategies and future needs.

Topics: experimental design (what do I want to do?); instrument set-up (how do I do it?); recording 'metadata' (how will I do it again?); nomenclature and terminology (how will I report my results?); data interpretation (what does 'ion intensity' really mean? where is the interface in my depth profile?); matrix effects; validation methods; quantitative SIMS.

Requirements: there are no special requirements for this course.