



Workshop on Elemental Analysis with ICP-MS and Isotopic Analyses with MC-ICP-MS and TIMS

Date: 30th & 31st July 2018

About the Workshop:

This workshop will provide background to the methods and application utilized by archaeologist and archaeological scientists to study provenance of ancient glass. Following general introductions to the methods and their employment in archaeology, the instructors will provide more detail information on the various methods, strengths and weaknesses, comparisons with other methods, and their uses. Information will be provided on sample preparation, data acquisition and post-collection processing, and how to interpret the results. More specific information will be provided on the usage of the presented methods and techniques in the provenance of archaeological glasses, but analysis of other archaeological materials also will be discussed.

About the Instructors:

Laure Dussubieux, Ph.D. is a chemist specialized in the determination of the compositions of ancient artifacts made from synthesized or natural glass, metals and stones. She obtained her PhD in Chemistry from the University of Orléans (France) in 2001 with a dissertation focused on the use of laser ablation – inductively coupled plasma – mass spectrometry (LA-ICP-MS) to study the provenance and the circulation of ancient glass beads around the Indian Ocean. Prior to her appointment at the Field Museum, she was a post-doctoral fellow at the Smithsonian Institution (Museum Support Center, Maryland, USA) where she developed the application of LA-ICP-MS to the study of ancient gold and the use of portable X-Ray Fluorescence to survey cultural artifacts. Since 2004, she has managed the Elemental Analysis Facility (EAF) at the Field Museum and her current title is Research Scientist. She is responsible for developing analytical protocols with LA-ICP-MS or XRF, training students in using analytical equipment and helping with data interpretation. At the EAF, in a little more than a decade, she facilitated more than 150 projects dealing with questions related to the archaeology of cultural production, interaction and exchange. Several of these projects involve the sourcing of stones such as carnelian, agate, garnet or lapis lazuli. She is also co-teaching (with p. Ryan Williams and Mark Golitko) a class about Analytical Archaeology at the University of Illinois at Chicago.

Thomas R. Fenn, Ph.D., is an archaeologist with more than two decades of applying archaeological sciences methods and techniques to answering archaeological and anthropological questions. He has extensive archaeological sciences analytical training and

experience, and specializes in examining questions of provenance and trade/exchange networks through the application of chemical and isotopic analyses to a variety of archaeological materials, but mainly glass and metals. Dr. Fenn obtained his Ph.D. in Anthropology (Archaeology) from the University of Arizona (Tucson, Arizona, USA), while also minoring in geosciences, and he also has a M.Sc. in Geology and Geochemistry. Dr. Fenn's dissertation focused on the use of multi-collector – inductively coupled plasma – mass spectrometry (MC-ICP-MS) to collect isotopic data for study the provenance and movement of raw materials and finished goods (ceramics, metals and glass) in both the Old and New Worlds. Dr. Fenn is an Assistant Professor in the Department of Anthropology at the University of Oklahoma. Dr. Fenn's research covers a wide range of materials, regions and time periods with common threads of examining socio-economic and technological aspects of pyrotechnology and the derivative products. His research themes include long-distance trade, provenance studies, invention and innovation in ancient technologies, and the development and transfer of technological knowledge and materials. Some of his current research examines the development and movement of ancient glass and glass technology in India and the role this played within the Indian Ocean economic world.

Workshop Timing:

Time: 10 AM-12.30 PM and 2.30-5 PM

Venue: AB 6/203

Workshop Details:

1. Introduction

2. Instrumentation

2.1. ICP-MS

2.2. Sample introduction system

2.2.1. Liquid samples

2.2.2. Solid samples

3. Parameters of analysis

3.1. ICP-MS

3.1.1. Elements

3.1.2. Data acquisition parameters

3.2. Laser

4. Interfaces with ICP-MS

5. Measurements

5.1. Standardization

4.1.1. Internal standardization

4.1.2. External Standardization

5.2. Composition calculation

6. Application

6.1. ICP-MS - Common applications

6.2. LA-ICP-MS - Common applications (with a focus on archaeology)

7. Isotope Analysis

7.1. Introduction

7.1.1. What can isotopes tell us?

7.2. Different Isotope Systems

7.2.1. Neodymium (Nd)

7.2.2. Strontium (Sr)

7.2.3. Lead (Pb)

7.3. Sample Preparation

7.3.1. MC-ICP-MS

7.4. Instrumentation

7.3.1. Multi-Collector Inductively Coupled Plasma Mass Spectrometry (MC-ICP-MS)

7.3.2. Thermal Ionization Mass Spectrometry (TIMS)

7.3.3. Other instruments

7.3.4. Can we use Lasers for isotope analysis?

9. Elemental and Isotope Analysis in Archaeology

8.1. Introduction

8.2. Complementary, but Different

Note: Selected candidates will be informed via respective email tonight.