

Microscopic techniques to study mineral materials in cultural heritage

A workshop for the optimal use of polarized light microscopy and SEM to better understand archaeological and building materials

September 24 - 28, 2018

jointly organized by the
University of Applied Arts Vienna
BDA - Federal Monuments Authority Austria
Technische Universität Dresden

Venue
University of Applied Arts Vienna, 1010 Vienna, Stubenring 3

Organizers and lecturers

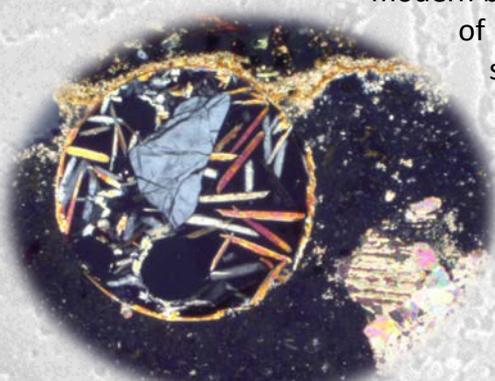
Prof. Dr. Johannes Weber, petrographer, University of Applied Arts Vienna/Austria
Dr. Farkas Pintér, geologist, BDA Vienna/Austria
Dipl.-Geol. Thomas Köberle, geologist, TU Dresden/Germany
Guest lecturer: Simona Raneri Ph.D., geologist, University of Pisa/Italy

“MICROSCOPY IS THE MOST EFFECTIVE ANALYTICAL TECHNIQUE FOR GATHERING INFORMATION ON HISTORIC ARTEFACTS AND BUILDING MATERIALS”

Background and aim of the Workshop

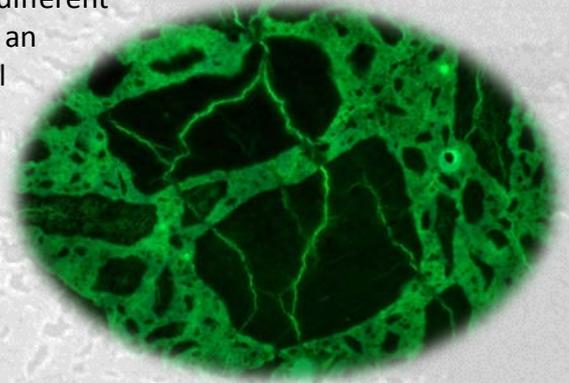
The analysis of the mineral material of architectural and archaeological objects in the laboratory is frequently a challenging task for conservation scientists, building researchers and archaeologists. It includes the identification and characterization of stones, mortars and ceramics as well as the assessment of their structural and material failures. Within the range of various methods of analysis employed, thin section petrography, especially when combined with SEM, offers a powerful method to gain relevant information on historical and modern building materials. As for most imaging analyses, the success of this approach does not only depend on the quality of the sections, but most of all on the skill of the expert in selecting the most appropriate mode of observation and interpreting the results.

Planned as a platform for scientists and experts with a background in mineral artefacts, the five-day workshop is aimed at demonstrating and discussing the potential of light microscopic and SEM techniques in the field of



restoration, building research, conservation science and archaeology-archaeometry. The main focus is laid on the thin section analysis of mortars, plasters, concrete, stone and ceramics by applying transmitted and reflective light. Composition, workmanship and degradation will be discussed.

The group will comprise 27 participants from 14 different countries. Lectures and discussions are in English. They will be jointly held by conservation scientists with degrees in geology and petrography and a sound background in the use of different microscopic techniques in their fields. Following an introduction on methodology, each type of material will be quickly discussed on a general level before displaying via beamer examples of analysis by microscopy of actual samples. Attendees are invited to forward their wishes to discuss specific topics more in detail. Also, please bring your own samples!



Venue

The venue is located in the main building of the University of Applied Arts Vienna in the heart of the historic city center, a ten minutes walk from the Cathedral and other places of interest. One of the major stations for local trains (including the one from the airport) and 2 metro lines is at 5 min walking distance (Bahnhof Wien Mitte).

Detailed Program

	Topic	Type	Lecturer
Monday, September 24			
08:20 - 09:00	Registration		
09:00 - 09:40	Welcome and organisational details, short presentation of participants		JW-FP-TK / all
09:40 - 09:50	Introduction: Microscopy in conservation and archaeometry	lecture	FP
09:50 - 10:30	Sample preparation	lecture	TK
10:30 - 11:00	Coffee break		
11:00 - 12:00	Polarized light microscopy: general basics & specific modes of observation	lecture	FP - JW
12:00 - 12:30	Natural stones: general classification and basic characteristics	lecture	JW
12:30 - 13:30	Rock forming minerals / Textures of natural stones - Part1	microscopy	JW - FP - TK
13:30 - 15:00	Lunch break		
15:00 - 15:30	Textures of natural stones - Part 2	microscopy	JW - FP - TK
15:30 - 16:30	Decay phenomena and consolidants in building stones	microscopy	JW - FP - TK
16:30 - 16:45	Coffee break		
16:45 - 17:30	Scanning electron microscopy	lecture	FP
Tuesday, September 25			
09:00 - 10:00	Mortars - classification and historical context	lecture	JW
10:00 - 11:00	Gypsum mortars	lecture	TK
11:00 - 11:30	Coffee break		
11:30 - 12:30	Gypsum mortars	microscopy	TK
12:30 - 13:30	Lunch break		
13:30 - 14:30	Lime and dolomitic lime	lecture	TK
14:45 - 19:00	Walking tour through Vienna downtown with special emphasis on architecture, building materials and conservation	excursion	M. Fichtinger JW - FP
19:30	Common dinner in a typical Vienna restaurant (guests welcome, price not included)		
Wednesday, September 26			
09:00 - 10:30	Lime and dolomitic lime	microscopy	TK - JW - FP
10:30 - 11:00	Coffee break		
11:00 - 11:30	Lime and dolomitic lime	microscopy	TK - JW - FP
11:30 - 12:00	Pozzolanic and brick lime mortars	lecture	JW
12:00 - 13:00	Pozzolanic limes	microscopy	JW - FP - TK
13:00 - 14:00	Lunch break		
14:00 - 14:30	Natural hydraulic lime	lecture	FP
14:30 - 15:30	Natural hydraulic lime	microscopy	FP - JW - TK
15:30 - 16:00	Coffee break		
16:00	Open questions and discussion		
19:00	Lime Mortars of Indian Heritage: Organic materials used to prepare mortars in India	Lecture (optional)	S. Thirumalini
Thursday, September 27			
09:00 - 10:00	Roman cement of the 19th cent.	lecture	JW
10:00 - 11:00	Roman cement	microscopy	JW - FP - TK
11:00 - 11:30	Coffee break		
11:30 - 12:30	Historical and modern Portland cement	lecture	FP
12:30 - 13:00	Discussion		all
13:00 - 14:30	Lunch break		
14:30 - 16:00	Historical and modern Portland cement	microscopy	FP - JW - TK
Friday, September 28			
09:00 - 09:45	Ceramic materials: general classification	lecture	SR
09:45 - 10:30	Technical parameters of ceramics seen by microscopy	lecture	SR
10:30 - 11:00	Coffee break		
11:00 - 12:30	Technical parameters seen by microscopy	microscopy	SR - JW - FP
12:30 - 13:30	Lunch break		
13:30 - 14:15	Archaeological pottery - provenience studied by microscopy	lecture	SR
14:15 - 14:30	Heavy mineral analysis for provenience studies	lecture	FP or JW
14:30 - 15:00	Coffee break		
15:00 - 16:30	Issues of provenience seen by the microscope	microscopy	SR - JW - FP
16:30	Closing of the Workshop. Coffee, feedback, closing statements, farewell		JW-FP-TK / all
Saturday, September 16 (Optional, registration requested at beginning of Workshop)			
09:00 - 13:00	SEM on samples of interest	microscopy	JW
14:30	Departure to Open Day at the Information and Training Center of Heritage Preservation in Mauerbach (Vienna Woods): historical craftsmanship, lime burning, etc.	excursion	JW
Lecturers		Venue	
JW: Johannes Weber, IATCS, University of Applied Arts Vienna FP: Farkas Pintér, Federal Monuments Authority Austria TK: Thomas Köberle, TU Dresden SR: Simona Raneri, University of Pisa (Guest Lecturer)		1010 Wien, Stubenring 3 (Main building of the University of Applied Arts (historic wing), Loft ("Dachgeschoss"))	