

18TH INTERNATIONAL MICROSCOPY CONGRESS

PROCEEDINGS

Prague, 7–12 September 2014
Microscopy for Global Challenges
touching atoms, molecules, nanostructures
and cells by multidimensional microscopy

 **CSMS** **IFSM**





18th International Microscopy Congress

Prague, Czech Republic

7 - 12 September, 2014

PROCEEDINGS

Edited by

Pavel Hozak

IFSM



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Foreword

Dear Colleagues,

I am honoured to welcome you to the 18th International Microscopy Congress. The International Microscopy Congress is held every four years under the auspices of the International Federation of Societies for Microscopy (IFSM) and it is truly the most important world microscopy event. This year, we have more 2 700 participants from 68 countries. I believe that all of you will use this opportunity not only to advance your research, but also to discover the beauties of the city of Prague and its surroundings.

The extensive scientific program consists of 8 plenary lectures, 122 invited and 425 oral presentations divided into 58 symposia in 4 specializations – Instrumentation and techniques, Materials science, Life sciences, and Interdisciplinary matters. More than 1 760 posters are presented in poster sessions. Our rich social program provides wonderful opportunities for informal talks and exchanging of experiences.

The success of the congress is due to the many people who have collaborated with us in planning and organizing this event. I would like to thank especially the International Scientific Program Committee, the International Advisory Board, and the IFSM board for their continuous support and guidance in shaping the scientific program. I would like to mention also the local organizing committee and the symposia chairs whose sincere commitment and exceptional efforts have supported the entire congress.

The Proceedings of the 18th International Microscopy Congress are presented in the electronic version on the USB stick and on the IMC 2014 On-line gate. The USB stick contains all plenary, invited and accepted abstracts submitted by the standard deadline. The on-line version includes in addition the abstracts submitted as the late poster abstracts.



Yours faithfully,

A handwritten signature in blue ink, which appears to read 'Pavel Hozák'.

Pavel Hozák
IMC 2014 chairman

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LIST OF SYMPOSIA

INSTRUMENTATION & TECHNIQUES

IT-1 **Electron optics and optical elements**

Oral: Thursday, 11 September 2014, 09:00–11:00, Small Hall

Poster: Wednesday and Thursday, 10–11 September 2014

IT-2 **High-resolution TEM and STEM**

Oral: SLOT A: Tuesday, 9 September 2014, 14:00–16:00, Meeting Hall 5

SLOT B: Wednesday, 10 September 2014, 14:15–16:15, Meeting Hall 5

SLOT C: Thursday, 11 September 2014, 14:00–16:00, Meeting Hall 5

Poster: Wednesday and Thursday, 10–11 September 2014

IT-3 **Super-resolution light microscopy and nanoscopy imaging**

Oral: Wednesday, 10 September 2014, 14:15–16:15, Small Hall

Poster: Wednesday and Thursday, 10–11 September 2014

IT-4 **Scanning electron microscopy**

Oral: Wednesday, 10 September 2014, 14:15–16:15, Meeting Hall 4

Poster: Wednesday and Thursday, 10–11 September 2014

IT-5 **Analytical electron microscopy**

Oral: SLOT A: Tuesday, 9 September 2014, 09:00–11:00, Meeting Hall 4

SLOT B: Tuesday, 9 September 2014, 14:00–16:00, Meeting Hall 4

SLOT C: Wednesday, 10 September 2014, 09:00–11:00, Meeting Hall 4

SLOT D: Thursday, 11 September 2014, 09:00–11:00, Meeting Hall 4

Poster: Wednesday and Thursday, 10–11 September 2014

IT-6 **Environmental electron microscopy**

Oral: Thursday, 11 September 2014, 14:00–16:00, Meeting Hall 4

Poster: Wednesday and Thursday, 10–11 September 2014

IT-7 **In-situ microscopic techniques and cryo-microscopy**

Oral: SLOT A: Monday, 8 September 2014, 11:00–13:00, Meeting Hall 4

SLOT B: Monday, 8 September 2014, 14:30–16:30, Meeting Hall 4

Poster: Monday and Tuesday, 8–9 September 2014

IT-8 **Ultrafast microscopies**

Oral: Thursday, 11 September 2014, 14:00–16:00, Club A

Poster: Wednesday and Thursday, 10–11 September 2014

- IT-9** **Electron diffraction techniques**
Oral: SLOT A: Monday, 8 September 2014, 11:00–13:00, North Hall
 SLOT B: Tuesday, 9 September 2014, 09:00–11:00, Meeting Hall 5
Poster: Monday and Tuesday, 8–9 September 2014
- IT-10** **Electron tomography**
Oral: SLOT A: Monday, 8 September 2014, 14:30–16:30, Small Hall
 SLOT B: Tuesday, 9 September 2014, 14:00–16:00, Small Hall
Poster: Monday and Tuesday, 8–9 September 2014
- IT-11** **Electron holography and lens-less imaging**
Oral: SLOT A: Tuesday, 9 September 2014, 09:00–11:00, Small Hall
 SLOT B: Wednesday, 10 September 2014, 09:00–11:00, Small Hall
Poster: Monday and Tuesday, 8–9 September 2014
- IT-12** **Surface microscopy and spectroscopy**
Oral: Monday, 8 September 2014, 14:30–16:30, Club A
Poster: Monday and Tuesday, 8–9 September 2014
- IT-13** **Focused ion beam microscopy and techniques**
Oral: Wednesday, 10 September 2014, 09:00–11:00, Meeting Hall 5
Poster: Wednesday and Thursday, 10–11 September 2014
- IT-14** **Scanning probe microscopy and near-field microscopies**
Oral: Monday, 8 September 2014, 11:00–13:00, Club A
Poster: Monday and Tuesday, 8–9 September 2014
- IT-15** **X-ray, neutron and other microscopies**
Oral: Wednesday, 10 September 2014, 14:15–16:15, Chamber Hall
Poster: Wednesday and Thursday, 10–11 September 2014
- IT-16** **Electron microscopy theory and simulations**
Oral: Monday, 8 September 2014, 11:00–13:00, Small Hall
Poster: Monday and Tuesday, 8–9 September 2014
- IT-17** **Atom probe and non-traditional micro-analytical tasks**
Oral: Thursday, 11 September 2014, 09:00–11:00, Club A
Poster: Wednesday and Thursday, 10–11 September 2014

MATERIALS SCIENCE

MS-1 Nano-objects and engineered nanostructures, catalytic materials

Oral: SLOT A: Monday, 8 September 2014, 11:00–13:00, Meeting Hall 1
SLOT B: Monday, 8 September 2014, 14:30–16:30, Meeting Hall 1
SLOT C: Tuesday, 9 September 2014, 09:00–11:00, Meeting Hall 1
SLOT D: Tuesday, 9 September 2014, 14:00–16:00, Meeting Hall 1

Poster: Monday and Tuesday, 8–9 September 2014

MS-2 Carbon-based nanomaterials, nanotubes, fullerenes and graphenes

Oral: SLOT A: Wednesday, 10 September 2014, 14:15–16:15, Panorama Hall
SLOT B: Thursday, 11 September 2014, 09:00–11:00, Panorama Hall
SLOT C: Thursday, 11 September 2014, 14:00–16:00, Panorama Hall

Poster: Wednesday and Thursday, 10–11 September 2014

MS-3 Thin films, coatings and surfaces

Oral: SLOT A: Wednesday, 10 September 2014, 09:00–11:00, Club A
SLOT B: Wednesday, 10 September 2014, 14:15–16:15, Club A

Poster: Wednesday and Thursday, 10–11 September 2014

MS-4 Metals, alloys and metal matrix composites

Oral: SLOT A: Wednesday, 10 September 2014, 09:00–11:00, Meeting Hall 1
SLOT B: Wednesday, 10 September 2014, 14:15–16:15, Meeting Hall 1
SLOT C: Thursday, 11 September 2014, 09:00–11:00, Meeting Hall 1
SLOT D: Thursday, 11 September 2014, 14:00–16:00, Meeting Hall 1

Poster: Wednesday and Thursday, 10–11 September 2014

MS-5 Ceramics and inorganic materials

Oral: SLOT A: Tuesday, 9 September 2014, 09:00–11:00, Chamber Hall
SLOT B: Tuesday, 9 September 2014, 14:00–16:00, Chamber Hall

Poster: Monday and Tuesday, 8–9 September 2014

MS-6 Polymers and organic materials

Oral: Thursday, 11 September 2014, 09:00–11:00, Chamber Hall

Poster: Wednesday and Thursday, 10–11 September 2014

MS-7 Composite materials and hybrids

Oral: Thursday, 11 September 2014, 14:00–16:00, Club C

Poster: Wednesday and Thursday, 10–11 September 2014

MS-8 Semiconductors and materials for information technologies

Oral: SLOT A: Tuesday, 9 September 2014, 09:00–11:00, North Hall
SLOT B: Tuesday, 9 September 2014, 14:00–16:00, North Hall

Poster: Monday and Tuesday, 8–9 September 2014

- MS-9** **Defects in materials and phase transformations**
Oral: SLOT A: Monday, 8 September 2014, 11:00–13:00, Club E
 SLOT B: Monday, 8 September 2014, 14:30–16:30, Club E
Poster: Monday and Tuesday, 8–9 September 2014
- MS-10** **Porous and architected materials**
Oral: Tuesday, 9 September 2014, 09:00–11:00, Small Theatre
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- MS-11** **Amorphous and disordered materials, liquid crystals, quasicrystals**
Oral: Monday, 8 September 2014, 14:30–16:30, Small Theatre
Poster: Monday and Tuesday, 8–9 September 2014
- MS-12** **Magnetic, superconducting, ferroelectric and multiferroic materials**
Oral: SLOT A: Wednesday, 10 September 2014, 09:00–11:00, North Hall
 SLOT B: Wednesday, 10 September 2014, 14:15–16:15, North Hall
 SLOT C: Thursday, 11 September 2014, 09:00–11:00, North Hall
 SLOT D: Thursday, 11 September 2014, 14:00–16:00, North Hall
Poster: Wednesday and Thursday, 10–11 September 2014
- MS-13** **Materials in geology, mineralogy and archeology**
Oral: Thursday, 11 September 2014, 14:00–16:00, Chamber Hall
Poster: Wednesday and Thursday, 10–11 September 2014
- MS-14** **Energy-related materials**
Oral: SLOT A: Monday, 8 September 2014, 11:00–13:00, Panorama Hall
 SLOT B: Tuesday, 9 September 2014, 09:00–11:00, Panorama Hall
 SLOT C: Wednesday, 10 September 2014, 09:00–11:00, Panorama Hall
Poster: Monday and Tuesday, 8–9 September 2014

LIFE SCIENCES

LS-1 Imaging of living cells, tissues and organs

Oral: Wednesday, 10 September 2014, 09:00–11:00, Club E

Poster: Wednesday and Thursday, 10–11 September 2014

LS-2 Structure and function of cells and organelles

Oral: Tuesday, 9 September 2014, 14:00–16:00, Panorama Hall

Poster: Monday and Tuesday, 8–9 September 2014

LS-3 High-resolution localization of molecular targets and macromolecular complexes

Oral: Tuesday, 9 September 2014, 09:00–11:00, Club E

Poster: Monday and Tuesday, 8–9 September 2014

LS-4 Structure of macromolecules and macromolecular assemblies

Oral: Monday, 8 September 2014, 14:30–16:30, Panorama Hall

Poster: Monday and Tuesday, 8–9 September 2014

LS-5 Cellular transport and dynamics

Oral: Monday, 8 September 2014, 11:00–13:00, Small Theatre

Poster: Monday and Tuesday, 8–9 September 2014

LS-6 Microbiology and virology

Oral: Thursday, 11 September 2014, 09:00–11:00, Meeting Hall 5

Poster: Wednesday and Thursday, 10–11 September 2014

LS-7 Invertebrates and parasitology

Oral: Tuesday, 9 September 2014, 14:00–16:00, Small Theatre

Poster: Monday and Tuesday, 8–9 September 2014

LS-8 Plant science and mycology

Oral: Wednesday, 10 September 2014, 09:00–11:00, Chamber Hall

Poster: Wednesday and Thursday, 10–11 September 2014

LS-9 Genetically-modified organisms and animal science

Oral: Tuesday, 9 September 2014, 14:00–15:00, Club C

Poster: Monday and Tuesday, 8–9 September 2014

LS-10 Human health and disease

Oral: Wednesday, 10 September 2014, 14:15–16:15, Club E

Poster: Wednesday and Thursday, 10–11 September 2014

LS-11 Physiology and pathology

Oral: Tuesday, 9 September 2014, 15:00–16:00, Club C

Poster: Monday and Tuesday, 8–9 September 2014

LS-12 **Advances in immunohistochemistry and cytochemistry**

Oral: SLOT A: Thursday, 11 September 2014, 09:00–11:00, Club E

SLOT B: Thursday, 11 September 2014, 14:00–16:00, Club E

Poster: Wednesday and Thursday, 10–11 September 2014

LS-13 **Embryology and developmental biology**

Oral: Monday, 8 September 2014, 11:00–13:00, Club C

Poster: Monday and Tuesday, 8–9 September 2014

LS-14 **Neuroscience**

Oral: Monday, 8 September 2014, 15:30–16:30, North Hall

Poster: Monday and Tuesday, 8–9 September 2014

INTERDISCIPLINARY

ID-1 **Correlative microscopy in life and material sciences**

Oral: SLOT A: Monday, 8 September 2014, 11:00–13:00, Meeting Hall 5

SLOT B: Monday, 8 September 2014, 14:30–16:30, Meeting Hall 5

Poster: Monday and Tuesday, 8–9 September 2014

ID-2 **Imaging mass spectrometry**

Oral: Wednesday, 10 September 2014, 14:15–15:15, Club C

Poster: Wednesday and Thursday, 10–11 September 2014

ID-3 **Microscopy of single-molecule dynamics**

Oral: Wednesday, 10 September 2014, 15:15–16:15, Club C

Poster: Wednesday and Thursday, 10–11 September 2014

ID-4 **High-throughput microscopy and its applications**

Oral: Monday, 8 September 2014, 14:30–15:30, North Hall

Poster: Monday and Tuesday, 8–9 September 2014

ID-5 **Nanoparticles: Applications and bio-safety issues**

Oral: Tuesday, 9 September 2014, 09:00–11:00, Club A

Poster: Monday and Tuesday, 8–9 September 2014

ID-6 **Forensic science**

Oral: Monday, 8 September 2014, 14:30–16:30, Club C

Poster: Monday and Tuesday, 8–9 September 2014

ID-7 **Arts, restoration and archeology**

Oral: Thursday, 11 September 2014, 09:00–11:00, Club C

Poster: Wednesday and Thursday, 10–11 September 2014

ID-8 **Three-dimensional reconstructions**

Oral: Thursday, 11 September 2014, 09:00–11:00, Small Theatre

Poster: Wednesday and Thursday, 10–11 September 2014

ID-9 **Microscopic image analysis and stereology**

Oral: Monday, 8 September 2014, 11:00–13:00, Chamber Hall

Poster: Monday and Tuesday, 8–9 September 2014

ID-10 **Advances in sample preparation techniques**

Oral: Tuesday, 9 September 2014, 14:00–16:00, Club E

Poster: Monday and Tuesday, 8–9 September 2014

ID-11 **Multidisciplinary applications of progressive light microscopy imaging techniques**

Oral: Monday, 8 September 2014, 14:30–16:30, Chamber Hall

Poster: Monday and Tuesday, 8–9 September 2014

ID-12 **In situ and environmental microscopy of material reactions and processes**

Oral: SLOT A: Wednesday, 10 September 2014, 09:00–11:00, Small Theatre

SLOT B: Wednesday, 10 September 2014, 14:15–16:15, Small Theatre

Poster: Wednesday and Thursday, 10–11 September 2014

ID-13 **Materials for medicine and biomaterials**

Oral: Thursday, 11 September 2014, 14:00–16:00, Small Theatre

Poster: Wednesday and Thursday, 10–11 September 2014

Type of presentation: Poster

ID-7-P-3030 Can Microscopy help in the identification of counterfeit artworks? Test on Vase of flowers, attributed to Italian artist Filippo De Pisis

Volpe L.¹, Vaccaro C.¹, Vaccaro C.²

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In the field of Cultural Heritage, the safeguard of artworks contends new and complex problems linked not only to conservative condition, maintenance, etc. but also to the introduction of fakes and problems related to this aspects. In the last years, dating and authentication studies, mainly based on historical-artistic-stylistic researches, have been supported by scientific world through identification of artistic techniques and materials, underlining the important role of "dating pigments".

The identification of this kind of pigments provides for in depth chemical-physical analysis, and, always more frequently, the contribute of microscopy can be fundamental, especially for artificial pigments in modern and contemporary artworks. In fact, if traditional chemical-physical analysis allows to recognize pigments, only studying the morphology of pigments' particles is possible to understand better their origin (natural or artificial, ancient or modern, etc.).

The present studies shows results obtained by researches carried out on *Vase of Flowers*, a painting attributed to Filippo De Pisis (1896-1956), important and renewed Italian artist (Fig. 1a). Some doubts about the authenticity of the expertize, which accompanies the artworks, increased suspicion related to the originality of artwork too.

The comparison between this artwork and other painting made by De Pisis, through preliminary analysis carried out by optical microscope on whole artwork, already showed different artistic techniques (Fig. 1b). Moreover, even if chemical analysis identified pigments belonging to De Pisis palette, such as White Titanium Oxide, more interesting results was obtained by SEM/EDS and μ Raman, carried out on μ samples taken from original area (Fig. 1c): the identification of White Titanium Oxide particles (Rutile phase) with diameter less than 0.5 μ m (Fig. 1d-e) suggests the use of pigment introduced on commerce in 1957, and so after death of artist [1-3]. Therefore, considering that pigments used in this artwork are not compatible with the period, the research suggests that the analyzed artwork could be a counterfeit painting [4], highlighting how chemical-physical analysis linked to microscopy studies could help in solving doubts about artistic attribution, also for contemporary artworks.

References

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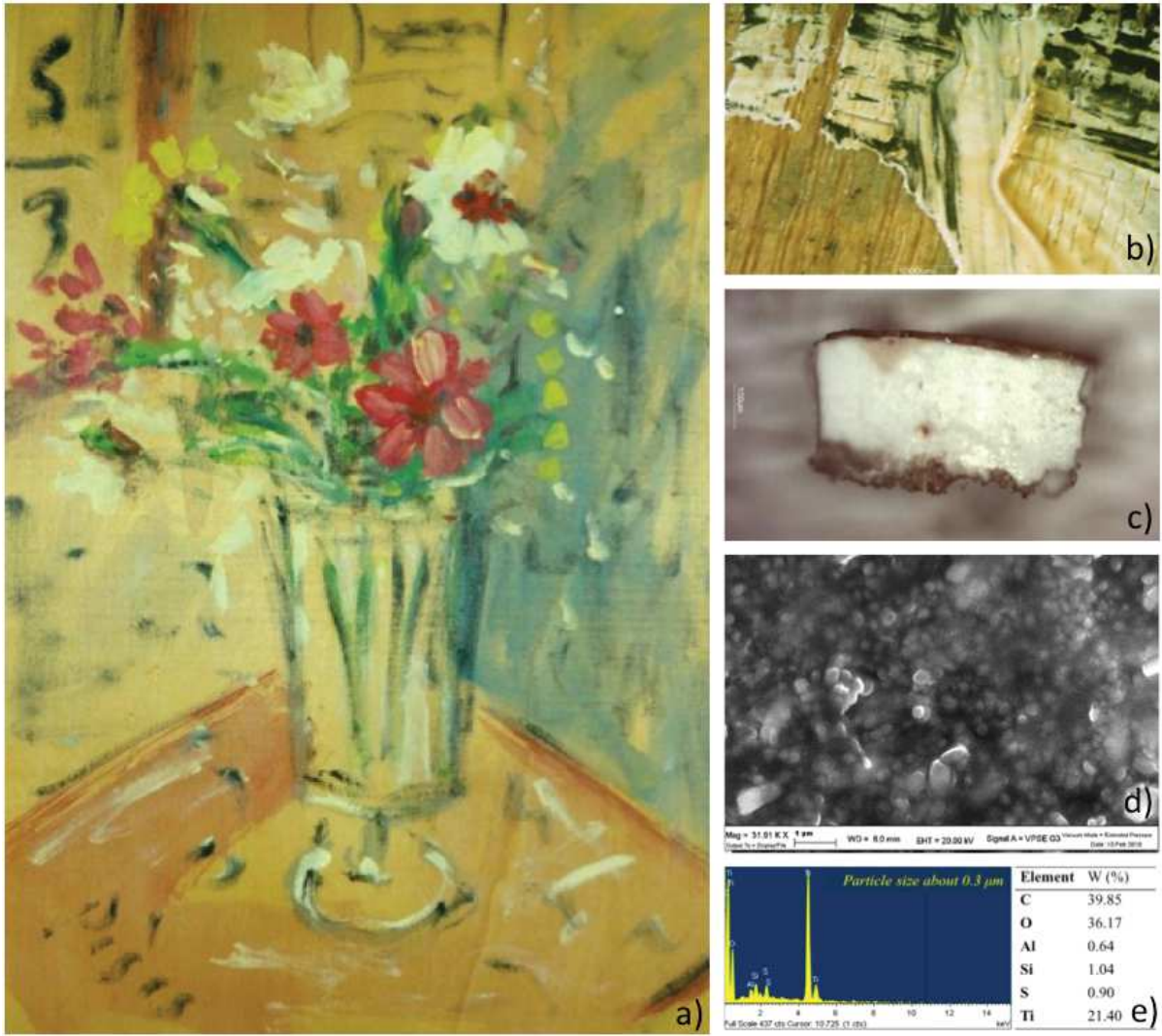


Fig. 1: Fig. 1. Vase of Flower (oil on wood), attributed to F. De Pisis: a) painting VIS investigation; b) microphotographs of brushstroke differently enriched in matter (OM, mag. 13.4 x); c) sample of White pigment; d) e) SEM/EDS analysis carried out on sample c) shows pigment particle which dimension are less than 0.5 μm.