

## MAIN TOPICS OF RESEARCH

- Indoor climates and microclimates
- Air analysis in the museum environment and inside museum showcases
- Emission testing of building and decoration materials
- Emission test chambers and cells
- Analysis of airborne pollutants (VOCs/SVOCs, formaldehyde, organic acids)
- Wood preservatives and other biocides
- Heavy metal analysis
- House dust and particles in the indoor environment
- Adsorbent materials for pollutant reduction
- Spectral imaging in the VIS and NIR ranges
- Numerical simulation of climate processes

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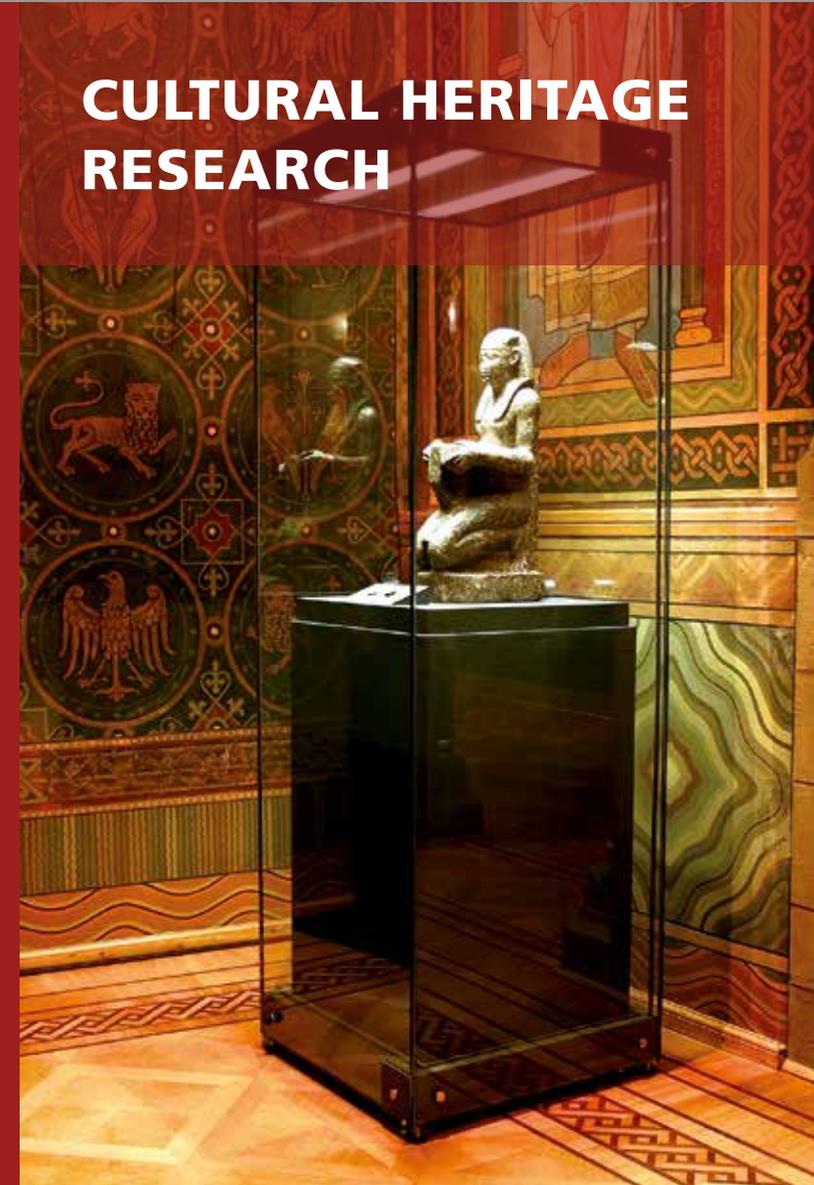
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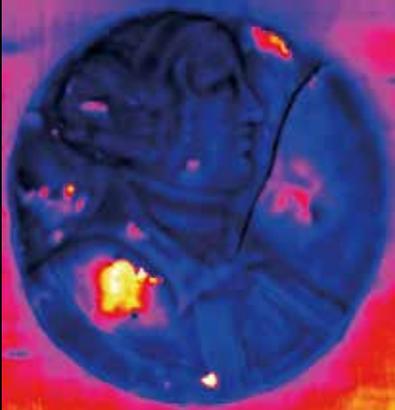
*Cover image: Figurine of Philip Arrhidaeus, ca. 320 B.C.  
By courtesy of the Herzog Anton Ulrich-Museum, Braunschweig*

## CULTURAL HERITAGE RESEARCH

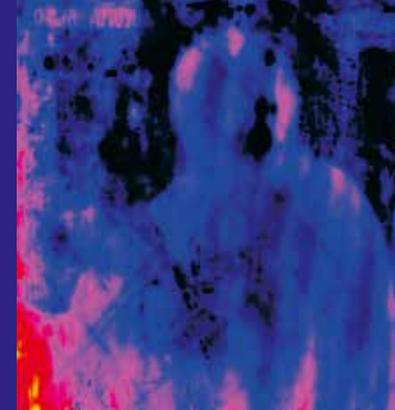


*We have emphasised the use of environmentally-friendly materials in the production of this flyer.*





## RESEARCH INTO PRESERVING OUR CULTURAL HERITAGE



Human history and identity is reflected in the enormous variety of our cultural heritage. To gain access to these monuments by means of research and to preserve them for future generations is an interdisciplinary challenge for society as a whole.

### CULTURAL HERITAGE RESEARCH AT THE FRAUNHOFER WKI

At the Fraunhofer WKI, well-established scientific analytical methods are modified to allow them to be used with cultural assets. New approaches and assessment strategies for preserving our cultural heritage are being developed. This applies in particular to the subject areas of indoor hygiene, non-destructive testing and building physics.

#### Indoor air pollutants in the museum environment

Both monuments and mobile cultural assets are likewise at risk from climate changes and also the influence of airborne pollutants.

The Department of Material Analysis and Indoor Chemistry

- performs analyses of volatile and semi-volatile organic compounds (VOCs/SVOCs), organic acids and formaldehyde in indoor air in exhibition and storage rooms as well as museum showcases
- carries out measurements of house dust and particles
- investigates indoor climate
- evaluates indoor air quality based not only on the target and reference values available but also on the current state of knowledge regarding damage mechanisms

Knowledge of the potential emissions from building materials used in the immediate environment of cultural assets makes it possible to make specific adjustments to room climates and microclimates. Available for this purpose are

- emission test chambers and cells
- standard analytical methods and test procedures.

Special focuses of research pertain to:

- indoor air quality in museums and material emissions inside museum showcases
- the use of sorbent materials to minimize airborne pollutants
- biocide contamination of museum rooms and exhibits

#### Non-destructive testing of cultural assets

Non-destructive methods of analysis are often required in investigating and researching historical monuments and museum objects as well as in documenting of restoration work. Here active infrared thermography provides an innovative solution. Unlike other physical methods it visualizes differences in heat capacity and conductivity and raises no safety problems. This non-destructive testing technique was developed at the Fraunhofer WKI and is employed in the investigation of icons, terracottas and historical furniture. In particular, watermarks can be displayed better since the density variations in the paper can be examined with the help of thermographic transmission.

#### Coupled transportation of temperature and humidity

A central question of building physics is the thermohygric behavior of materials, especially in historical buildings. For these buildings and wooden cultural assets the reaction to changing environmental conditions as regards temperature and air humidity is of great practical importance. At the Fraunhofer WKI the coupled transportation of temperature and humidity is investigated with the aid of numerical simulation. Measuring techniques for the verification of simulations as well as for the examination of full-size parts of buildings in double climatic chambers are also available.