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Action D42

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ENVIART

COST Action D42 "ENVIART"

Norway: Impact of four years networking

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Summary:

Norway has been represented in the management committee of COST Action D42 "ENVIART" with two people both representing the Norwegian Institute for Air Research (NILU). The participation of NILU in the ENVIART project has made possible European wide communication of results from NILUs work in the field of preventive conservation for indoor cultural heritage.

Main participation of the Norwegian delegates in Cost D42 activities:

- 24th April 2010. Institute of Technology. Chalon-sur-Saône, France. *COST D42 Workshop on "Environmental care for preventive conservation: filtration, climate, pollution, cfc and modelling".*

Grøntoft, T: "Air quality services for cultural heritage professionals"

- 6th May 2009. Vienna University of Technology, Institute of Chemical Technologies and Analytics, Austria: *Cost D42 EnviArt Training school on "Indoor Air Quality in museums, Galleries and Archives: Analytical Methods and Preventive Conservation Strategies".*

Grøntoft, T.: "Simple devices for monitoring and assessment of indoor air quality for museums, archieves and historic buildings".

- 24th -26th May 2009. *Cost D42 Workshop on "Showcases - Inside Out".* Porto , Portugal.

Dahlin, E.: "Early Warning Dosimeter for Environmental Conditions inside Showcases - Results from Monitoring Campaigns in Europe".

- 16th April 2008. Vienna University of Technology, Institute of Chemical Technologies and Analytics, Austria. *COST D42 WG 1 Workshop on "State of the Art and Progress in the Assessment of Museum and Archive Atmospheres".*

Grøntoft, T.: The methodology for assessment Indoor Air Quality levels for organic objects in archives, museums and libraries related to the use of the EWO (Early Warning Organic) dosimeter.

- 30-31st May 2007. Ohrid, FYROM. *COST strategic workshop; Past – Present – Prediction – about simulation techniques, dosimeters, sensors, in conservation research and application.*

Grøntoft, T.: An early warning dosimeter for organic materials in museums, historic buildings and archives.

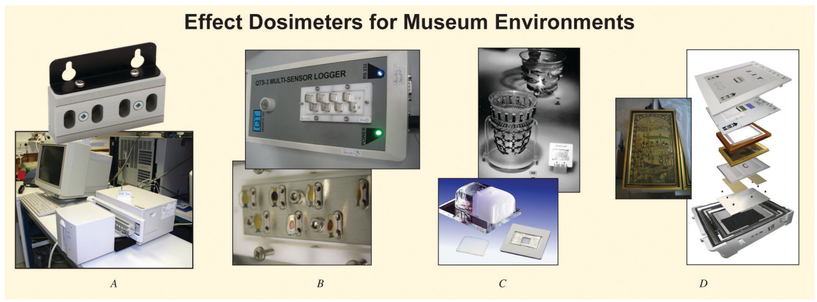

Figure 1: Three types of dosimeters used in the EU porject PROPAINT.

The three types of dosimeters seen in Figure 1 were developed to assess the quality of the air envirionment for cultural heritage objects. The NILU EWO dosimeter (A) was presented by NILU during the Cost D42 activities described above. Piezo electric quartc crystal (PQC) dosimeters (B) and glass slide (GSD) dosimeters (C) were applied by the University of Birkbeck and the Fraunhofer Institute, respectively, in the EU project PROPAINT which was coordinated by NILU (see also below) and for which Cost D42 has offered good opportunities for dissemination.

STSM mission: - NILU researcher Lopez-Aparicio, S. visited the University of Pisa (DCCI) in May 2009. The purpose of the visit was to obtain insight in ongoing work with analytical chemical characterisation, by the use of mass spectrometry, of varnishes and degradation of varnishes exposed to pollutant gases in museum environments.

Main participation of the Norwegian Cost D42 delegates in other cultural heritage conservation activities with added benefit due to Cost D42 participation:

Several conferences. Among them: - *NKF-D (Nordic Conservators Association – Denmark) conference. "Incredible Industry".* 27th May 2009, Copenhagen, Denmark. PP presentation: "Degradation of modern synthetic polymers in museum collections. Mechanisms, environmental influence and assessment".

*Figure 2: Front page of PP presentation given at the conference; "Incredible Industry". **27th May 2009.***

The EWO dosimeter was, as is illustrated by Figure 2, developed for the assessment of the indoor Air Qulity for Organic cultural heritage objects.

- Nordic Conservators Society / Finish branch conference. "Analyze this". 17th Feb 2009, Helsinki, Finland. PP presentation, "Air Pollutants. Sampling and Analysis Methods in Museums and Collections. - With particular focus on dosimetry."

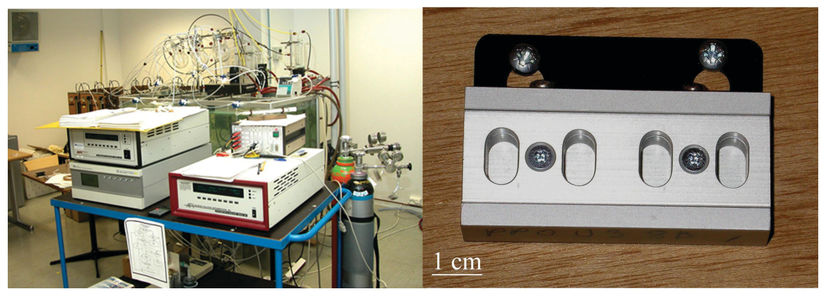

Figure 3: Monitors (left) and the EWO dosimter (right) for measurement of Air Quality.

In the "Analyze this" - conference NILU presented a range of instruments that can be used indoors to measure pollutants and climate for the purpose of improved preservation of cultural heritage. Figure 3 shows monitors for active measurements of single pollutant gases and the NILU EWO dosimeter that can be used to measure the generic photo-oxidizing effect of the envirionment on organic objects.

- EU conference CHRESP. "Cultural Heritage Research Meets Practice." 11th Nov 2008, Ljubljana,Slovenia. NILU Exhibition, Oral presentation and Paper.

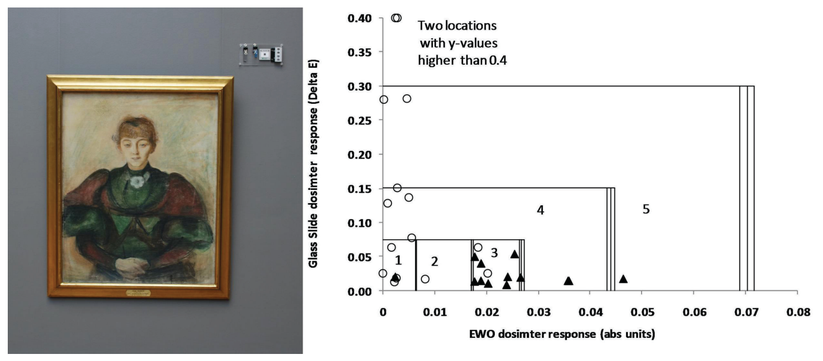

Figure 4: Results presentation from measurements of air quality for paitnings inside 13 microclimate frames performed in the EU project PROPAINT. The frame from the National Gallery in Oslo is seen tothe left.

In the EU conference CHRESP the potential for improved assessment of the quality of microclimates for cultural heritage, such as microclimate frames for paintings, by the combined use of a pair of dosimeters was presented. Figure 4 shows measurement results for the NILU EWO dosimeter, which is sensitive to photo-oxidising effects (x-axis), and for the Fraunhofer GSD dosimeter, which is sensitive to acidic effects (y-axis), plotted in a location-tolerability diagram with recommended levels for cultural heritage objects in indoors locations: [1]: Archive store, [2]: Purpose built Museum Gallery, [3]: Historic House Museum, [4]: Open display in open museum, [5]: Outside store with no control. The close vertical lines are the RH dependence for each level (RH = 45, 50 and 55 %).

- IAQ conferences: 21-23rd April, 2010 Chalon Sur saone, France. 16-19th April, 2008 Vienna, Austria. 15-19th Nov. 2006 Brauschweig, Germany.

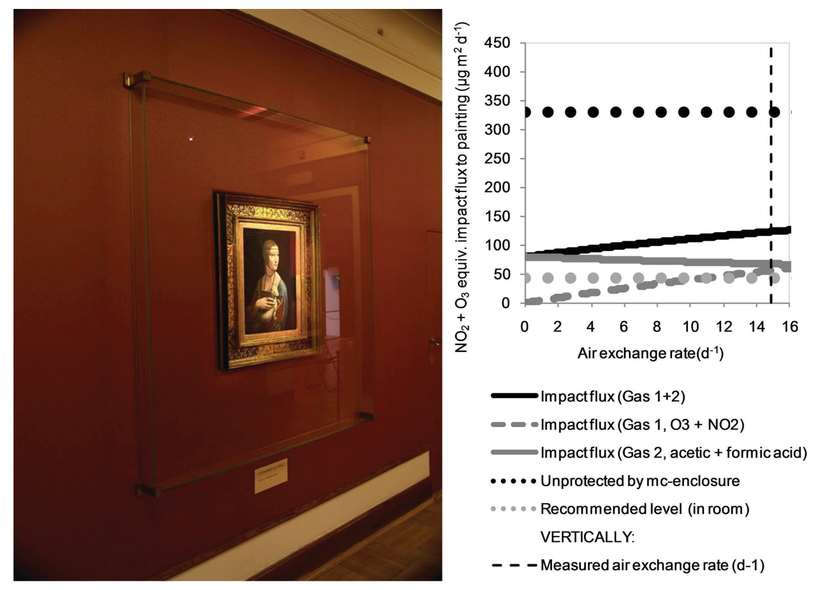

Figure 5: Results from modelling of the load of air pollutants to a painting inside a micro-climate enclosure, performed in theEU project PROPAINT.

In the IAQ conference in Chalon sur Saone, 2010, NILU presented a model that can be used to study how the design properties of microclimate frames affect the pollution load to the enclosed paintings. Figure 5 shows how the total pollution load of NO_2, O_3, acetic and formic acid to the enclosed Leonardo painting (left) would vary depending on the air exchange rate of the enclosure. The actual measured air exchange is given by the vertical dotted line. The recommended levels that were used for the evaluation were: $NO_2 + O_2$; 2 μg m^{-3}, and acetic + formic acids; 100 μg m^{-3}.

EU FP projects: PROPAINT and TeACH. Cost D42 has given opportunity for dissemination and knowledge transfer.

Figure 6: The logos for the EU projects PROPAINT and TeACH

The Cost action D42 ENVIART has given NILU the opportunity to reach the larger community of European conservation scientiests and conservatores with results created in the EU projects PROPAINT and TeACH (Figure 6).

The above mentioned work has resulted in a number of scientific papers and other publications directed towardes the field of conservation science and practice. Some of these are:

Dahlin, E. (ed.) EU project POPAINT. Final report. "Improved Protection of Paintings during Exhibition, Storage and Transit" *NILU OR 42/2010*. http://propaint.nilu.no/

Grøntoft, T., Odlyha, O., Mottner, P., Dahlin, E., Lopez-Aparicio, S., Jakiela, S., Scharff, M., Andrade, G., Obarzanowski, M., Ryhl-Svendsen, M., Thickett, D., Hackney, S., Wadum, J., Dosimetry for evaluation of environmental conditions for paintings in microclimate frames. *Journal of Cultural Heritage, In Press, Corrected Proof*, Available online 21 May 2010.

Lopez-Aparicio, S.*, Grøntoft, T., Dahlin, E. Air Quality Assessment in Cultural Heritage Institutions using EWO Dosimeters. *e-Preservation Science. Vol. 7, 2010*. Pages 96-101.

Lopez-Aparicio, S.*, Grøntoft, T., Odlyha, M., Dahlin, E., Mottner, P., Thickett, D., Ryhl-Svendsen, M., Schmidbauer, N., Scharff, M. Measurement of Organic and Inorganic Pollutants in Microclimate Frames for Paintings. *e-Preservation Science. Vol. 7, 2010*. Pages 59-70.

Grøntoft, T. and Lopez-Aparicio, S., Degradation of modern synthetic polymers in museums and environmental assessment with EWO dosimetry. Incredible industry. Preserving the evidence of the industrial society, *Conference Proceedings. Denmark*, May 2009. Pages 67-74.

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