

## Some European Projects in Preservation of Cultural Heritage

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### Some European Projects in Preservation of Cultural Heritage

#### *ABSTRACT*

European projects in preservation of cultural heritage MIP (Transitional Metals in Paper), InkCor (Stabilization of paper containing iron-gall inks), Papyrus (Chemiluminescence - a novel tool in paper conservation studies), Papertreat (Evaluation of mass deacidification processes), SurveNIR (Near Infrared Tool for Collection Surveying) and COST Action D42 (Chemical Interactions between Cultural Artefacts and Indoor Environment - EnviArt) and IDAP (Improved Damage Assessment of Parchment) are presented and brief information on their aims, tools and results are provided in the paper.

**Descriptors:** acidity, archives, cultural heritage, deacidification, degradation, EU projects, chemiluminescence, iron-gall inks, paper, parchment, preservation, transitional metals

### Alcuni progetti europei di conservazione del patrimonio culturale

#### *SINTESI*

Vengono qui descritti alcuni progetti europei di conservazione del patrimonio culturale, quali MIP (Transitional Metals in Paper - Metalli transitori nella carta), InkCor (Stabilization of paper containing iron-gall inks - Stabilizzazione della carta contenente inchiostri con galla di noce), Papyrus (Chemiluminescence - a novel tool in paper conservation studies - Chemiluminescenza, un nuovo strumento negli studi della conservazione della carta), Papertreat (Evaluation of mass deacidification processes - Valutazione dei processi di deacidificazione), SurveNIR (Near Infrared Tool for Collection Surveying - Strumenti all'infrarosso per la perizia delle collezioni) and COST Action D42 (Chemical Interactions between Cultural Artefacts and Indoor Environment - EnviArt - Interazioni chimiche fra manufatti culturali ed ambiente interno) and IDAP (Improved Damage Assessment of Parchment - Valutazione dell'aumento del rischio per le pergamene), e nell'articolo vengono fornite brevi informazioni riguardo i loro scopi, strumenti e risultati.

### Evropski projekti na področju varovanja kulturne dediščine

#### *IZVLEČEK*

V prispevku so podane kratke informacije o ciljih, pripravi in rezultatih evropskih projektov MIP (Transitional Metals in Paper), InkCor (Stabilization of paper containing iron-gall inks), Papyrus (Chemiluminescence - a novel tool in paper conservation studies), Papertreat (Evaluation of mass deacidification processes), SurveNIR (Near Infrared Tool for Collection Surveying), COST Action D42 (Chemical Interactions between Cultural Artefacts and Indoor Environment - EnviArt) in IDAP (Improved Damage Assessment of Parchment) s področja varovanja arhivskega gradiva.

### Niektoré európske projekty v oblasti ochrany kultúrneho dedičstva

#### *ABSTRAKT*

Príspevok prezentuje a podáva stručné informácie o cieľoch, nástrojoch a výsledkoch niektorých európskych

projektov v oblasti ochrany kultúrneho dedičstva – MIP(Prechodové prvky v papieri), InkCor (Stabilizácia papierov obsahujúcich železodubienkové atramenty), Papyrus (Chemiluminiscencia - nový prostriedok na štúdium konzervovania papiera), Papertreat (Vyhodnocovanie procesov masovej deacidifikácie), SurveNIR (Prostriedok na štúdium zbierok v blízkej infračervenej oblasti), COST D42 (Chemické interakcie medzi kultúrnymi artefaktmi a podmienkami vnútorného prostredia ich uloženia) a IDAP (Zlepšené hodnotenie poškodenia pergamenu).

In order to be able to protect archival collections against harmful and detrimental effects, first of all it is necessary to know these effects and to understand the nature of the deteriorative and destructive factors. This is the reason why a lot of awareness is devoted to cultural heritage preservation in many countries and in the European Union as joint projects of different countries and institutions. This fact is proved by many European projects in this field. Participation in international projects represents a unique opportunity to develop a broad international cooperation, to preserve and present archival heritage to international public and to create possibilities for better access to archival documents through modern technology for all archives, too. Some of them will be briefly presented in this paper in order to provide at least the basic information about their activities.

The project **Transitional Metals in Paper (MIP)** was a thematic network of the 5<sup>th</sup> framework programme of the EU (**EVK4-CT-2002-20010**) (2003-2006). The consortium banded together the following institutions: Netherlands Organization for Applied Research, TNO, (John Havermans, coordinator of the project), National Archives of Sweden, National Archives of Estonia, National Archives of the Netherlands, Archivo de la Corona de Aragón, Barcelona, Faculty of Chemical and Food Technology, Slovak University of Technology Bratislava, Göteborg University, Sweden, Slovak National Archives, Bratislava, EVTEK Vantaa, Finland, Museum Boijmans van Beuningen, Rotterdam, The Netherlands, University of Northumbria Newcastle upon Tyne, UK, Jagiellonian University, Krakow, Poland, National and University Library Ljubljana, Slovenia, National Library of Norway, Art Innovation, The Netherlands, Netherlands Institute of Cultural Heritage, Amsterdam, University of Ljubljana, Slovenia, Conservation atelier Quillet, La Rochelle, France, University of La Rochelle, France, Zentrum für Bucherhaltung, ZFB Leipzig, Germany, University of Roma, La Sapienza, Italy, National Library of France, Paris, Museu Moli Paperer de Capellades, Spain.

The role of a network was to improve contacts between researchers and key persons in the field of preservation of archives, libraries and museums. For MIP it was the field of paper degradation and the role of the (transition) metals in the paper substrate. Degradation of the paper substrate was not the main goal actually but preventing it for further degradation and to find solutions in conservation. Therefore dissemination of work in this field from MIP to MIP members and from MIP to non-MIP members and vice versa was an important action in the organization during and after the MIP-age.

The aim of the network was to respond collectively to specific threats to European paper based cultural heritage in relation to transition metals in paper. Four theme groups (TG) were established to discuss and cluster their specific topics. The groups were based on both fundamental issues and applied issues such as applications. TG-1 covered the fundamental scientific aspects of paper degradation focusing primarily on diagnostic and analytical techniques, studies of degradation processes (including endogenous and exogenous factors), and methodologies for paper stability evaluation. TG-2 covered the chemical aspects of active conservation while TG-3 worked on the physical aspects of active conservation. Finally TG-4 was dealing with preventive conservation issues<sup>1</sup>.

Within the MIP framework 7 open and 3 project management meetings, 1 final international MIP conference<sup>2</sup>, 1 joint international conference with two EU projects InkCor and Papyrus<sup>3</sup> and 3

1. [www.miponline.org](http://www.miponline.org).

2. Symposium proceedings: *MIP2006/2nd International Meeting on Iron Gall Ink Corrosion – Pre Conference Proceedings*. Edited by John Havermans, 24-27 January 2006, Newcastle Upon Tyne, United Kingdom.

3. Proceedings of the *International Conference Durability of Paper and Writing*. Editors: Jana Kolar, Matija Strlic and John Havermans, 16-19 November 2004, Ljubljana, Slovenia (ISBN 961-6162-98-5).

other international conferences<sup>4, 5, 6</sup> were organized.

Two types of deliverables were foreseen in the MIP network - both were successfully fulfilled. The first one was to reach a broad range of interested parties and to establish future co-operations. The second one was to establish gaps in knowledge and needs in conservation and conservation research<sup>7</sup>.

The problems caused by iron gall inks and their possible degradation impact on paper or parchment support are well-known to experts in the field of archives and library preservation. These inks belong to the most wide-spread writing inks and were used since antic period through the middle-ages until recent times<sup>8</sup>. Their basic components are tannin (gall acid), iron sulphate and gum Arabic. In Europe, they were used mostly for writing since the 11<sup>th</sup> until the beginning of the 20<sup>th</sup> century.<sup>9, 10</sup> These inks were used by medieval monks also for drawing of manuscript illuminations. They were often used also by scientists and artists (Leonardo da Vinci, Rembrandt, Guercino, Lorrain, van Gogh, J. S. Bach) for different scientific and works of art as well as for music scores<sup>11</sup>. In archives, libraries, museums and galleries all over the world there exists a lot of manuscripts and drawing made by iron gall inks. In spite the fact that these inks last for centuries in high quality, they can cause also serious problems. High acidity of some inks contributes to the hydrolytic cleavage of cellulose macromolecules; the effect of soluble iron ions to their oxidative degradation<sup>12</sup>. Already 100 years ago at the memorable conference in St. Gallen F. Ehrle from the Vatican Library warned against possible degradation effect of iron gall inks<sup>13, 14</sup>. Despite the problems of paper degradation by the influence of iron gall inks has been known for a long time and many interesting results have been achieved<sup>15, 16, 17</sup>, systematic research in a large scale started in particular after the European conference on this subject in Boijmans

4. Symposia Healthy Indoor Environment "Preventive Conservation of Objects Containing Cellulose Deteriorated by Metals", Symposium Proceedings Edited by John Havermans. TNO Bouw, 17 September 2004, Delft/The Hague, The Netherlands (ISBN 90-5986-099-3).
5. Symposium proceedings: 'Research and applications of spectroscopy in related to conservation science and needs in conservation' Symposium proceedings edited by John Havermans and Yeghis Keheyan, CNR, 17-18 February, 2005, Rome, Italy.
6. Symposium proceedings 'Best of MIP', Symposium proceedings edited by John Havermans, Istvan Keckskemeti and Jaan Letharu, 10-11 December 2005, Riga, Latvia.
7. John HAVERMANS, *MIP, Metals In Paper, EVK4 2002-20010, 36 Months Networking*, Final Report.
8. F. SEDLÁK - J. HANUS, *Z dejín výroby železodubienkových atramentov*, „Slovenská archivistika“ 13(1978), N. 1, p. 111-142.
9. C. JAMES, *The evolution of iron gall ink and its aesthetical consequences*. The Postprints of the Iron Gall Ink Meeting, A.J.E. Brown (Ed.), Newcastle-upon-Tyne: The University of Northumbria at Newcastle, 2001, pp. 13-23.
10. M. LEVEY, *The manufacture of inks, liqs, erasure fluids, and glues - a preliminary survey in Arabic chemical technology*, „Chymia“, 7(1961), pp. 57-72.
11. <http://www.knaw.nl/ecpa/ink/intro.html>.
12. J. HANUS - A. MAKOVÁ - J. MINÁRIKOVÁ - E. HANUSOVÁ - Z. SZABÓOVÁ - B. HAVLÍNOVÁ - M. ČEPPAN, *Železogatové atramenty - vznik a podstata, degradačné účinky. Prieskum stavu rukopisov v SR*. Ochrana kultúrneho dedičstva VIII - Fórum konzervátora. Zborník príspevkov z odborného seminára, Martin 2005, Slovenské národné múzeum Bratislava, Slovenská národná knižnica Martin. Edícia Malá knižnica muzeologickej literatúry, ISBN 80-8060-179-8. Bratislava 2006, s. 89-93.
13. F. EHRLE, *Über die Erhaltung und Ausbesserung alter Handschriften. Die Internationale Konferenz in St. Gallen*, 1898.
14. F. EHRLE, *Die Internationale Konferenz in St. Gallen am 30. September und 1. Oktober 1898 zur Beratung über die Erhaltung und Ausbesserung alter Handschriften*, 1899.
15. Ch. H. WUNDERLICH, *Geschichte und Chemie der Eisengallustinte - Rezepte, Reaktionen und Schadwirkungen*, „Restauro“, 100(1994), pp. 414-421.
16. G. BANIK - H. STACHELBERGER - K. MESSNER, *Untersuchung der destruktiven Wirkung von Tinten auf Schriftträgermaterialien*, „Restauro“ 94(1988), N. 4, pp. 302-308.
17. J. NEEVEL - G. PHYTATE, *A Potential Conservation Agent for the Treatment of Ink Corrosion caused by Iron Gall Inks*. „Restauro“, 16(1995), pp. 143-160.

museum in Rotterdam<sup>18, 19, 20, 21, 22</sup>.

The scientific-research project **InkCor - Stabilization of Iron Gall Ink Containing Paper (EVK4-CT-2001-00049)** (2001-2004) - was implemented under the Fifth Framework Programme<sup>23</sup>. The aim of the project was development of methods for conservation of documents containing iron gall inks. The partners, coordinated by Jana Kolar, National and University Library, were researchers from Slovenia, The Netherlands, Germany and France. The results unanimously pointed to the necessity of two-step conservation procedures - elimination of acidity (deacidification) and using of antioxidants in order to prevent oxidation of above mentioned Fe<sup>2+</sup> ions in iron gall inks. Project outputs were presented also at the international conference in Ljubljana in November 2004<sup>3, 24</sup>. A book summarizing the results of the project was published in 2006<sup>25</sup>.

Degradation of cellulose and loss of its utility properties is caused mainly by two principal processes - acidic hydrolysis and oxidation. The first reaction is direct cleavage of 1,4 β-D-glucosidic bond which occurs after its interaction with hydrogen ions and results in formation of semi-acetale terminal chain groups (pH < 7).

On the other hand, the oxidation of cellulose is much more complicated process proceeding via oxidation of hydroxyl groups on glucopyranosic structural units under the formation of carbonyl and carboxyl groups enabling cleavage of cellulose macromolecules. Both processes - formation of semiacetale groups and hydroxyl groups oxidation - are accompanied by a weak light emission, chemiluminescence<sup>26</sup>.

This very principle is used for monitoring of cellulose degradation changes by equipment so called chemiluminometer Lumipol, developed and produced at the Polymer Institute, Slovak Academy of Science in Bratislava. The utilization of this methodology for monitoring of degradation of lingo-cellulosic materials of information supports was the subject of EU project **Papyrus - Chemiluminescence - A Novel Tool in Paper Conservation Studies** (EVK-CT-2000-00038). The coordinator of the project was Matija Strlič, University of Ljubljana, partners the Polymer Institute, Slovak Academy of Science, Bratislava, The Netherlands Institute of Cultural Heritage, Amsterdam, National and University Library Ljubljana, Centre National d'Evaluation de Photoprotection Ensemble Scientifique des Cézaux, Aubière, France and European Commission (DG XII). In this connection project provides also very interesting and promising results of correlation between chemiluminescence intensity and mechanical properties changes of paper in the course of its degradation<sup>27, 28, 29</sup>. The achieved

18. *Proceedings from Workshop on Iron-Gall Ink Corrosion*. Rotterdam, June 16-17, 1997, H. van der Windt (ed.), Rotterdam Museum Boijmans van Beuningen, Netherlands Institute for Cultural Heritage.

19. G. BANIK, (1997): *Decay Caused by Iron-gall Inks*. In *Proceedings European Workshop on Iron-gall Ink Corrosion*, Rotterdam, June 16 and 17, 1997., H. van der Windt (ed.), Rotterdam Museum Boijmans Van Beuningen /Instituut Collectie Nederland. ISBN 90-6918-189-4.

20. *Tintenfrassschäden und ihre Behandlung*, Banik, G., Weber, H. (eds) (1999), Stuttgart, W. Kohlhammer GmbH.

21. *Tintenfraß. Studiengang Restaurierung und Konservierung von Graphik, Archiv- und Bibliotheksgut*, Banik, G. Hrsg. (2000), Stuttgart. ISBN: 3-931485-39-0.

22. <http://www.knaw.nl/ecpa/ink/index.html>.

23. <http://www.infosrvr.nuk.uni-lj.si/jana/Inkcor/index.html>.

24. <http://www.paperdurability.org/>.

25. *Iron gall inks : on manufacture, characterisation, degradation and stabilisation*, J. Kolar, M. Strlic (Eds.), Narodna in univerzitetna knjižnica, 2006, ISBN 961-6551-19-1.

26. J. RYCHLÝ - M. STRLIČ - L. MATISOVÁ-RYCHLÁ - J. KOLAR, *Chemiluminescence from paper. 1. Kinetic analysis of thermal oxidation of cellulose*. Polym. Degrad. Stab. 78, 357-367, 2002.

27. Z. SZABÓOVÁ - J. RYCHLÝ - J. HANUS - J. MINÁRIKOVÁ - L. MATISOVÁ-RYCHLÁ, *The service time prediction of hardwood paper from non-isothermal chemiluminescence measurements and estimation of paper properties by other standard tests*, In *3rd European Weathering Symposium Natural and Artificial Ageing of Polymers*, T. Reichert editor - Krakow September 2007, CÉEEES Publication No 8, 2007 ISBN 978-3-9810472-3-3, p. 337-347.

28. J. HANUS - J. RYCHLÝ - J. MINÁRIKOVÁ - L. MATISOVÁ-RYCHLÁ - Z. SZABÓOVÁ, *Estimation of paper degradation progress by chemiluminometry and folding endurance changes*. Proceedings of the International workshop „Practical applications of chemiluminescence at the oxidation of chemical systems“. Smolenice, October 9-13, 2005, p. 10-12.

29. J. HANUS - J. RYCHLÝ - J. MINÁRIKOVÁ - L. MATISOVÁ-RYCHLÁ, *Estimation of the progress of oxidative ageing of various papers by chemiluminescence method and estimation of papers properties by other standard tests*. International Conference Durability of paper and writings, Papyrus, InkCor, MIP, 16.-20. 11. 2004 Ljubljana. Proceedings of the conference, p.

results of the project are summarized in publication *Ageing and Stabilization of Paper*<sup>30</sup>.

The biggest problems in preservation of archives and libraries are caused - paradoxically - by modern papers produced from the 2nd half of the 19th up to the recent years. The new technology of paper-making introduced in 1850, involved paper formation in an acidic environment and wood as the raw material. This was a crucial milestone from the point of permanence and durability of paper, its degradation and preservation in archives and libraries. The self-degradation effect of acidic papers causes the limited lifetime of machine-made paper from wood pulp with acidic rosin sizing with addition of alum. These problems are well known to the experts from the field of preservation of archives and library paper materials. It seems that - because of large quantities of these materials - only mass deacidification can help to solve these problems.

A large scale research into the field for many years has brought an extensive knowledge in paper degradation causes, mechanisms and also in different techniques and processes in order to improve its permanence, durability and life-span<sup>31, 32</sup>. Many deacidification processes have been introduced and several treatments are commercially used in a large scale<sup>33, 34, 35, 36, 37</sup>.

However, despite all these achievements it seems that still some problems have to be solved. Among the most serious are ranked the following ones: which of the chemical processes offered is most effective; which collection materials should be subjected to such a mass treatment; which analytical methods should be used for evaluation of deacidification processes and life prediction after the treatment; which standards should be developed, which quality standards should be defined, etc<sup>38, 39, 40</sup>.

The European project **PAPERTREAT - Evaluation of Mass Deacidification Processes**, contract No. SSPI- 006584, project duration 2005 - 2008, coordinated by Jana Kolar (National and University Library, Ljubljana, Slovenia) was devoted to this subject<sup>41</sup>. Partners of the project were the following institutions: Ljubljana University, Slovenia, The Netherlands Organization for Applied Research, TNO, Jagiellonian University, Krakow, Poland, National Archives of the Netherlands, National Archives of Sweden, Slovak National Archives, Bratislava, British Library London, UK, Russian National Library, Moscow, Royal Library of the Netherlands and European Commission for Preservation and Access.

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22-23.

30. *Ageing and stabilization of paper*. Eds. M. Strlič, J. Kolar. Ljubljana, National and University Library, 2005, 211 p. ISBN 961-6551-03-5.

31. *Preservation of Paper and Textiles of Historic and Artistic Value II*, Williams, J. C. ed., American Chemical Society 193, Washington, DC, 1981.

32. K. B. HENDRIKS, *Permanence of Paper in the Light of six centuries of Papermaking in Europe*. Actes des Deuxièmes Journées Internationales d'Études de l'ARSAG. Paris 1994, p. 131-137.

33. *Save Paper! Mass Deacidification, Today's Experience - Tomorrow's Perspectives*. Papers given at the International Conference 15-17 February 2006, Blüher, A., Grossenbacher, G. editors, Swiss National Library, Berne, Switzerland. ISBN 3-9523188-1-7.

34. J. PORCK HENK, *Mass Deacidification - An Update of Possibilities and Limitations*. European Commission on Preservation and Access, Amsterdam and Commission on Preservation and Access, Washington, September 1996, 54 p.

35. J. HANUS, *Trendy v oblasti masového konzervovania archívnych a knižničných fondov*, „Slovenská archivistika“, 2000, N. 1, s. 18-29.

36. A. BLÜHER, *Experience in Paper Deacidification - Three Years of Operation in the Swiss National Library*, „Papierrestaurierung“ 4(2003), pp. 21-28.

37. G. BANIK - T. DOERING - D. KOLBE - U. HÄHNER, *Mass deacidification of library and archival holdings. Report of a research funded by DFG*. In *Save Paper! Mass Deacidification, Today's Experience - Tomorrow's Perspectives. Papers given at the International Conference 15-17 February 2006*, Agnes Blüher - Gabriela Grossenbacher editors, Swiss National Library, Berne, Switzerland. ISBN 3-9523188-1-7.

38. G. BANIK, *Mass Technology in Germany and its Quality Control*, „Restaurator“, 2005, p. 63-75.

39. G. BANIK - T. DOERING - D. KOLBE - U. HÄHNER, *Quality Control of mass deacidification of library and archival holdings*. ICOM-CC 14<sup>th</sup> Triennial Meeting, The Hague 14-16 September 2005, Preprints (Volume I), ed. Isabelle Verger, James & James Earthscan, London, pp. 157-165.

40. J. HANUS - S. KATUŠČÁK - M. ČEPPAN - V. BUKOVSKÝ - J. RYCHLÝ - E. HANUSOVÁ - J. MINÁRIKOVÁ - Z. SZABÓOVÁ, *Research on paper deacidification in Slovakia (The approach to cultural heritage preservation in archives and libraries)*. In *Save Paper! Mass Deacidification, Today's Experience - Tomorrow's Perspectives. Papers given at the International Conference 15-17 February 2006*, Agnes Blüher - Gabriela Grossenbacher editors, Swiss National Library, Berne, Switzerland. ISBN 3-9523188-1-7, pp. 75-91.

41. <http://www.infosvr.nuk.uni-lj.si/jana/papertreat/index.html>.

Several typical model papers with different selected writing inks - representing the most utilised real types since the half of the 19<sup>th</sup> century until nowadays - were used for the project and deacidified in selected commercial deacidification systems. The principal aim of the project was comparison of stabilization effects reached by used mass deacidification systems and to establish criteria and methodical procedures facilitating evaluation of their effectiveness. Results of the project provide information on comparison of new and traditional methods of conservation, quality control of evaluation of selected processes as well as basic cost calculations. Many results were presented at the final international conference *Durability of Paper and Writing 2*<sup>42</sup>.

**SurveNIR - Near Infrared Tool for Collection Surveying** is another significant EU project in the field of cultural heritage preservation - especially of paper documents<sup>43</sup>. Its aim was to develop non-destructive method for characterization of historical papers based on spectroscopy in near infra-red range - (NIR), and thus to exclude using of chemical agents and preparation of samples in order to apply this method safely also outside a laboratory; another goal was to develop a portable equipment for these measurements and facilitate survey of whole collections while reducing significantly analyzing time. The developed NIR equipment enables non-destructive measuring of flat objects. Its size is 350 x 240 x 150 mm, weight less than 10 kg and it is easily portable. The measuring range is within the wave-length interval of 1100 - 2500 nm (9100 - 4000 cm<sup>-1</sup>).

Special software enabling statistical evaluation of tested samples was also developed within the project. While the instrument and the software provide data on the composition of paper, the software also enables the user to survey according to visually assessed properties, e.g. status of binding, pest damage, mould damage, ink corrosion etc. These properties can be categorised into up to four classes and the user decides on categorisation criteria prior to the survey. The SurveNIR software enables surveys of single sheets (graphic arts, archival documents, maps etc.) or bound objects (books). It is good practice to prepare a listing of the objects in a table with identification data beforehand.

During work, NIR spectra are automatically evaluated and the modelled chemical and physical properties appear on the screen. Based on these values, it is possible to define and calculated indices, which may help the end user in decision-making, e.g. based on a well-defined 'access index' it is automatically possible to calculate the percentage of a collection which can be only conditionally accessed due to very low mechanical properties. The major SurveNIR results are: SurveNIR instrument, specially designed for surveys of paper-based collections, the accompanying SurveNIR software based on chemometrics and a tool enabling the collection manager to randomly select a subset of objects from large collections to be surveyed.

Coordinator of the project was Matija Strlič, Slovenia, partners Zentrum für Bucherhaltung Leipzig, Germany, National and University Ljubljana, Slovenia, The Netherlands National Archives, British Library, London, Victoria & Albert Museum, London, UK, National Archives of Sweden, State Archives in Dubrovnik, Croatia and National Museum of Denmark.

COST (Cooperation in Science and Technology) is one of the longest running European programs supporting cooperation among the scientists and researchers in Europe. Within the framework of the EU research initiatives 106 project was devoted to the cultural heritage in the period 1986-2006. Twenty of them dealt with the impact and influence of environment conditions of storage to their degradation. On June 28, 2006 a new action was approved - **COST Action D42 "Chemical Interactions between Cultural Artefacts and Indoor Environment (EnviArt)"** (2006-2010)<sup>44</sup>. The main objectives of the program were as follows: chemical interactions between cultural artefacts and typical indoor environmental conditions; chemical impact of pollutants on CH materials, thus also considering environmental aspects, materials technology, chemical analytics, emission and harmonization as well as indoor environmental parameters and relation outdoor-indoor environment. Six focus areas were combined in three working groups with common focus to fundamental research and dissemination and education. Working Group 1: Preservation had two focus areas: Degradation & Stabi-

42. *Durability of Paper and Writing 2: Book of Abstracts*: 2nd International Symposium and Workshops, Ljubljana, Slovenia, July 5-7, 2008 [editors Matija Strlič and Jana Kolar]. - Ljubljana: Faculty of Chemistry and Chemical Technology, 2008. ISBN 978-961-6286-97-8.

43. <http://www.science4heritage.org/survenir>.

44. <http://www.echn.net/enviart/>.

lisation and Prevention. The application of sensitive techniques such as AFM, HPLC and synchrotron FTIR and XRD has improved understanding of the chemical changes occurring to proteinaceous materials in different environments. Correlations have been made between the microscopic and physical properties of such materials, dramatically improving our early assessment of damage and allowing an artefacts vulnerability to catastrophic environmental changes to be assessed. Working Group 2: Analysis - the object and the environment made the WG on analysis of D42 complex and challenging. Considering the lively activity within this WG, it can be concluded that areas of research which seem to be on the rise are the use of spectroscopic methods in combination with chemometrics, the use of chromatographic methods for both environmental analysis and polymeric materials (natural and synthetic) and environmental monitoring. Working Group 3: Guidelines - focussing on guidelines for both methods and storage and health makes that there is a strong synergism between D42 'WG3' with the CEN TC346 'WG4-Environment'. Recently this resulted in a first discussion on the harmonized application of simple industrial devices measuring the relative humidity. Here standardized sensors are applied, however the housing design made the sensors not responding adequately. Items as: 'new specification for light and lighting for exhibitions of art and artworks'; 'harmonization of indoor environmental conditions'; scientific differences between current methods for artificial pollution'; 'RH in cultural heritage and interaction of moisture with historic materials'; and 'the role of a historical climate' were frequently discussed. The project was completed by the final conference "Impact of the Indoor Environment on the Preservation of our Moveable Heritage" at the Trinity College Dublin on November 8-9, 2010.<sup>45</sup> The project was coordinated by John Havermans, The Netherlands Organization for Applied Research, TNO, Holland, vice-chair was Mieke Adrieans. University of Gent, Belgium with partners from 22 countries.

Parchment, made from partially-tanned animal skin, has been used since the 2nd century B.C. and it undergoes the irreparable damage caused by time. To limit this ageing process, European scientists studied and isolated the reasons for its degradation within the framework of a 3-year programme supported by the European Union - The IDAP ("**Improved Damage Assessment of Parchment**") project (EVK4-CT-2001-00061) (2001-2005), funded by the EC under the 5th Framework Programme<sup>46</sup>. An online data base containing the results of the study has been created. Expertise gathered from the IDAP project has made it possible to define the products which physically and chemically degrade collagen, the main substance from which parchment is made. The results of these three years of observation are currently available over the Internet to public and private conservation experts worldwide in order to help them optimise their parchment conservation and restoration methods. The IDAP project was divided into 3 stages: the first stage was to create a protocol for the visual evaluation of parchment which was easy to use and inexpensive and which could be adopted by libraries, national archives and private conservators. Researchers at the Copenhagen School of Conservation in Denmark studied the transparency, flexibility and colorimetrics of parchment using extremely precise light and colour measurements. In the second stage in the IDAP project, experiments were performed using sophisticated chemical analysis techniques in order to pinpoint the main causes of the deterioration of collagen, the principal substance which parchment is made of. The Danish scientists from the Copenhagen School of Conservation worked on the relationship between the premature ageing of collagen and temperature variation, raising the question of the harmful effects of global warming on the conservation of parchment<sup>47</sup>. The data base which is currently on line represents the third stage of the Europe-wide project and contains all the observations gathered during the three-year parchment study.

At the conclusion of our paper we would like to draw the attention to the publication elaborating by group of experts from archives and archival institutions of EU member states which also set out the main field of activities and cooperation in the field of archives preservation<sup>48</sup>.

45. [http://www.tcd.ie/Library/preservation/assets/Book%20of%20abstracts\\_271010\\_Final.pdf](http://www.tcd.ie/Library/preservation/assets/Book%20of%20abstracts_271010_Final.pdf).

46. [http://www.cyf-kr.edu.pl/-ncbratas/pdf/organic\\_4\\_larsen\\_poster.pdf](http://www.cyf-kr.edu.pl/-ncbratas/pdf/organic_4_larsen_poster.pdf).

47. R. LARSEN, *Improved Damage Assessment of Parchment, IDAP: micro and non-destructive analysis and diagnosis for proper storage and treatment*, [http://www.cyf-kr.edu.pl/-ncbratas/pdf/full\\_larsen.pdf](http://www.cyf-kr.edu.pl/-ncbratas/pdf/full_larsen.pdf).

48. EUROPEAN COMMISSION, *Report on archives in the enlarged European Union - Increased archival cooperation in Europe: action plan*. Elaborated by the National Experts Group on Archives of the EU member states and EU institutions and organs at the request of the Council of the European Union. Luxembourg: Office for Official Publications of the European Communities 2006, 248 pp. ISBN 92-79-00870-6.

*SUMMARY*

Archives and libraries all over the world contain a rich and irreplaceable source of information. They also represent a unique part of the cultural heritage of human society. The preservation and management of those precious resources and making them accessible for public are the main responsibilities and tasks of all these institutions. Preservation of archives is a summary of processes and proceedings ensuring stability and preservation of documents against damage or destruction, treatments of damaged documents by conservation and restoration processes as well treatments of all documents during processing, making accessible, using, exhibition, etc. Preservation of enormous quantities of different types of documents can be solved only by a thorough research as an interdisciplinary complex problem in which the role of paper scientists and their co-operation with experts from other fields of science and technology and practical end-users, conservators and restorers, is an inevitable and the only solution. As these problems are very common for archives, libraries and museums, many activities in the field of preservation are carried out in very close co-operation between these institutions on a national and international level. European projects in preservation of cultural heritage MIP (Transitional Metals in Paper), InkCor (Stabilization of paper containing iron-gall inks), Papyrus (Chemiluminescence - a novel tool in paper conservation studies), Papertreat (Evaluation of mass deacidification processes), SurveNIR (Near Infrared Tool for Collection Surveying) and COST Action D42 (Chemical Interactions between Cultural Artefacts and Indoor Environment - EnviArt) and IDAP (Improved Damage Assessment of Parchment) are presented and brief information on their aims, tools and results are provided in the paper.

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