Research Project

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Detail from mfa 16.34a, an embroidered mantle with composite figures. AD 100-200, MFA

The Andean Colours

The role played by fibers in Andean cultures was unique when compared to other civilizations; engineering problems were solved with fiber technology as in Inca suspension bridges, community ties were woven with the help of textiles, and the dramatic events of life, such as birth and dead, were celebrated with them. As a cultural and historic record, Andean textiles "form the longest continuous textile record in world history" and in the archaeological sites of the Andean coast, namely of Paracas, characterized for their aridity, a surprisingly large number of fabrics were preserved, spanning from about 3000 B.C. to the present. In this project, the superb colors of ancient Andean textiles from the MFA collection are studied; the dyes used for their production characterized together with the mordant ions necessary to complex them to the fiber. The dyes are extracted using recently developed mild methods and characterized by HPLC-DAD-MS. Microfluorescence, a non-destructive in situ technique, is also being applied.

In collaboration with Museum of Fine Arts-Boston.

Publications

Melo, M.J., Claro, A., Rodrigues, I., Montague, M., Newman, R., The colour of Andean textiles from the MFA collection, DHA 26, Austria, 2007.

All the projects and case studies are the result of a collaboration between the Textile Conservation and Restoration Laboratory (responsible Micaela Sousa) and the Scientific Laboratory (responsible Maria João Melo) with national and international institutions, namely with the National Museum Machado de Castro.

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TEXTILE CONSERVATION AT UNL

Detail from a Persian Carpet, Tp 47. MNAA, XVI century.

In 2005 cooperation between the *Museu Nacional Machado de Castro*, in Coimbra, and the Department of Conservation and Restoration of Universidade Nova de Lisboa was launched. The Museum could offer the know-how of its collections, their merits and history, whereas the Department of Conservation and Restoration was available to carry out research on the technology and conservation of relevant objects selected by both partners, normally in the frame of education and training programmes such as students' internships and dissertations.

Different research projects were undertaken as far as textiles are concerned. Two 16th/17th century Middle East carpets and a group of embroidered 17th and 18th century Portuguese (so-called Arraiolos') carpets were studied and partly conserved. The most surprising and rewarding results were obtained for an Iranian carpet commissioned by the former Convent of Sainte Claire, in Coimbra, and dating back to the late 16th or early 17th century. From the design, weave, variety and wealth of materials it could be ascertained that it was a luxury product from the court workshops founded by Shah Tahmasp I. The support provided by the field specialist Jessica Hallet at this step was priceless. Another rare, little Kashan carpet was investigated in order to develop a suitable solution to remove an old, rather disturbing stain. Fibre and dye identification were also carried out for the Arraiolos' carpets.

The training programmes were completed by the practice of conservation treatments in the Museum and design of preventive conservation solutions for both temporary and standing storage areas.

Pedro Redol
Museu Nacional Machado de Castro – MNMC

Case Study CS

Study and conservation of a 16th Persian Carpet

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A late 16th century Persian knotted-pile carpet with a vine-scroll field and cartouche border represents one of the most important recent discoveries in Islamic textiles in Portugal. A detailed material, art historical and technical study was fundamental for appreciating its importance, and especially for undertaking its conservation and restoration.

In collaboration with MNMC.

Publications

Armindo, E., Sousa, M. M., Melo, M. J., Hallett, J. "A Persian Carpet's Paradise Garden: discovering historical and technical aspects through carpet conservation and restoration", ICOM 2008, 2008 (submitted).

Snake. Detail from a Persian Carpet, TP764. XVII century, NMMC

Case Study CS

Discovering the colours of Portuguese Arraiolos carpets

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The Arraiolos carpets are an important and unique textile Portuguese tradition, with a great resemblance to the Persian carpets in its structure and decoration. A detailed study of the colour materials used in two middle 17th century Arraiolos carpets from the NMMC were carried out prior to conservation and restoration. The results obtained were compared with an original 19th century recipes collected in the Portuguese Arraiolos village, being possible to confirm the reliability of the original 19th recipes.

In collaboration with MNMC and Conceição Oliveira (DQ-IST).

Publications

Marques, R., Sousa, M. M., Oliveira, C.M. Melo, M. J., "Discovering the colours of Portuguese Arraiolos carpets" in Journal of Chromatography A, 2008 (submitted).

Detail from an Arraiolos Carpet, T831. XIX century, NMMC

Case Study CS

The colour of carpets

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For the exhibition of "Oriental Carpets in Portugal", the colours of 9 carpets, from the 16th and 17th century, from Museu Nacional de Arte Antiga and Museu Nacional Machado de Castro, were studied. Wool was identified in the pile of the carpets, with the exception of 'Kashan' carpet, made of silk (the small silk Kashan group).
In this study, 153 samples were characterized and mild extraction methods were used. Dye analysis was carried out with High Performance Liquid chromatography with diode array (HPLC-DAD) and with MS detector. Lac dye was identified in all red samples from the Indo-Persian carpets while cochineal was identified in the small silk Kashan. Indigo was found for the blues. Yellows in the indo-persian carpets were based in luteolin derivatives, while in the small silk Kashan were from the quercetin group. The results obtained for these Indo-Persian carpets are very homogeneus, being verified that the chromophores used for dyeing are the most stable to ageing.

In collaboration with MNAA and Jessica Hallet (DHA-UL).

Publications

Valsassina, M., Sousa, M. M., Melo, M. J. "The colour of the carpets" in Catalogue of Exhibition - The Oriental carpet in Portugal: Carpets and paintings, 15th-18th centuries. Lisbon, 2007, 161-168.

Detail from a Persian Carpet, TP16. XVII century, MNAA

Research Project RP

The Molecules of Colour in Art: a Photochemical study

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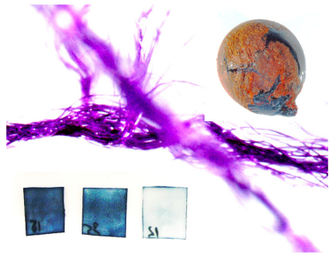
A full photophysical and photochemical characterization of dragon's blood, Brazil wood, alizarin, crocetin, indigo and their derivatives, is carried out.
The chromophores are studied in solution as well as in several solid state, heterogeneous media. This will enable more precise long term stability predictions and to understand the influence of external factors in the photodegradation pathway. This study will contribute to a better understanding of such outstanding historical organic molecules that are still of economic significance. A better understanding will permit a better conservation and access to our cultural heritage, such as manuscript illuminations and ancient textiles. UV-Vis fluorescence emission, one of the most sensitive spectroscopic techniques, is tested, to ascertain its viability as a powerful, non destructive method of analysis for organic colorants in objects of historical and cultural interest.

In collaboration with DQ-UC.

Selected publications

Melo, M. J., Sousa, M. M., Parola, A. J., Melo, S. S., Catarino, F., Marçalo, J., Pina, F. "Identification of 7,4'-Dihydroxy-5-methoxyflavylium in "Dragon's blood". To be or not to be an Anthocyanin", Chem. Eur. J., 2007, 13, 1417-1422.
Melo, S. S., Takato, S., Sousa, M. M., Melo, M., J., Parola, A. J. - "Revisiting Perkin's Dye(s): The Spectroscopy and Photophysics of Two New Mauveine Compounds (B2 and C).", in Chem. Com., 2007, 2624 – 2626.



Dragon's Blood (resin), Indigo (squares) and Mauve (fibre)

Research Project RP

Cleaning old textiles with supercritical carbon dioxide - Part I

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The supercritical carbon dioxide has a great potential in replacing current conventional conservation processes. Its use as a dry-cleaning solvent of old silk textiles was investigated. The harmfulness of the dry $scCO_2$ method, in which concerns colour variation due to the solubilization of the mordant ions, as well as loss of textile material, was evaluated in comparison to conventional wet-cleaning methods. The cleaning procedures under study were tested in the 18th century religious garments from "Virgin and Child" from Palácio das Necessidades, Lisbon. Contrary to the severe loss of material (50%) occurred during the wet-cleaning, the CO_2 at liquid and supercritical conditions proved to be a very safe solvent for the cleaning of very deteriorated silk textiles.

In collaboration with DQ-UNL and Institute of Museums and Conservation (IMC).

Selected publications

Sousa, M. M, Melo, M. J., Aguiar-Ricardo, A., Cruz, P. - "A Green approach to antique textile cleaning", in Paterakis, A.B. (Ed.), The 14th Triennial Meeting the Hague Preprints, Vol. II, ICOM Committee for Conservation, 2005, 944-953.

Detail from Virgin and Child Scapulary. 18th century, Necessidades Palace

Research Project RP

Cleaning old textiles with supercritical carbon dioxide - Part II

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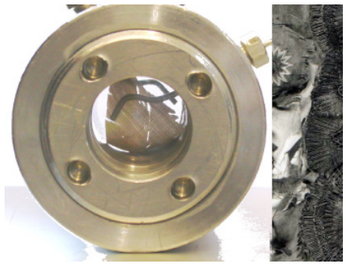
In order to increase the amount of dirt particles in heavily soiled areas of the Virgin and Child garments, the effect of different cleaning co-solvents was tested. The use of liquid CO_2 and the addition of water as co-solvent had a strong positive effect on removal of dirt particles and therefore a two-step process cleaning for this case study was proposed. In the first step, the textile is cleaned with supercritical CO_2 which is able to remove about 50-70% only of the unusual dirt particles found in textiles. In the second extraction, the textile is cleaned with liquid CO_2 removing approximately 50% of dirt particles from the more extensively soiled areas.

Selected publications

Sousa, M. M., Melo, M. J., Casimiro, T., and Aguiar-Ricardo, A. - "The art of CO_2 for art conservation: a green approach to antique textile cleaning" in Green Chem., 2007, 943-947.



Steel cell used in scCO2 cleaning of Virgin and Child garments