

Case Study: Physicochemical characterization of two 19th Century Portuguese *Carte-de-Visite* with non-destructive techniques

M. Peres¹, L. Dias², J. Mirão^{2,3}, T. Ferreira^{2,4}, L. Carvalho⁵, E. Jardim⁶, F. Costa¹

¹Centro de Ciências Moleculares e Materiais, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa

²Laboratório HERCULES - Herança Cultural, Estudos e Salvaguarda, Universidade de Évora, Largo Marquês de Marialva 8, 7000-809 Évora

³Centro de Geofísica de Évora, Universidade de Évora, 7000-676 Évora

⁴Centro de Química de Évora, Universidade de Évora, 7000-676 Évora

⁵Centro Física Atómica, Un. de Lisboa, Av. Prof. Gama Pinto, 2, 1649-003 Lisboa

⁶Centro de Filosofia das Ciências, Un. de Lisboa, Campo Grande, 1749-016 Lisboa

mariliaperes@ciberprof.com

The characterization of the conservation status of photographic material was usually made through visual analysis or optical microscopy. However, some photographs need further analytical studies.

The late 19th century photographs are chemically a multilayer material of several inorganic and organic compounds. The observed composition variety is a consequence of a large number of photographic products and processes that were used in those days as well as the result of ageing effects. The data about the chemical composition of a photographic material can be very useful in determining its age and authenticity as in searching for appropriate restoring techniques or storage protocols [1].

In this work, analytical studies were performed on two selected 19th century *carte-de-visite* from the photographer A. Sollas: a multi-technique non-destructive approach was used to determine the composition of selected photographic samples. Reflectance Fourier-Transform Infrared Spectroscopy allowed the identification of a protein material as well as the chemical nature of the protective material layer [2]. The surface morphology and homogeneity of uncoated samples were analysed in a variable pressure Scanning Electron Microscope (SEM-EDS) coupled with a Bruker X-Ray Energy Dispersion Spectrometer used for elemental composition estimation. X-Ray Fluorescence Spectroscopy (EDXRF) was also used for the *in-situ* analysis of the samples.

The main results of the study are discussed with regard to their historical significance and they are compared with data from historical and photographic literature.

[1] CATTANEO, B. et al (2008), Physicochemical characterization and conservation issues of photographs dated between 1890 and 1910, *Journal of Cultural Heritage*, 9: 277-284.

[2] RICCI, C. et al (2007), ATR-FTIR imaging of albumen photographic prints, *Journal of Cultural Heritage*, 8: 387-395.