STSM Abstract

Establishment of a standard methodology and further application of microfading spectrometry to the study of CH objects

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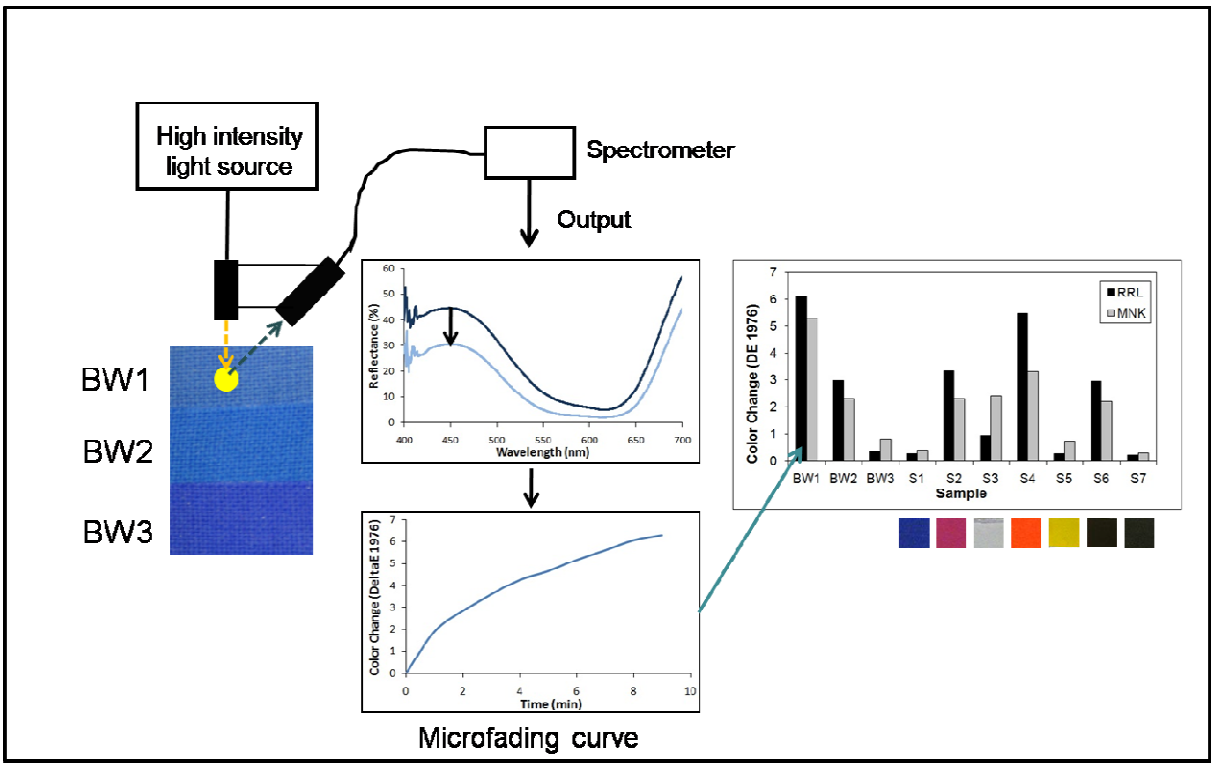
The Laboratory of Analysis and Non-Destructive Investigation of Heritage Objects (LANBOZ) of the National Museum in Krakow (MNK) and the Rathgen Research Laboratory (RRL) of the National Museums Berlin (NMB) wish to continue their research on the photosensitivity of colored materials found in cultural heritage (CH) objects. The aim of this short term scientific mission (STSM) was to establish standard working practices between the two institutions and to increase our common knowledge about the application of microfade testing (MFT) to the study of CH objects. Previous experiments have revealed that there might be some reproducibility issues associated with the use of different microfading testers when evaluating the photostability of the same sample. For this reason, comparison studies have become very necessary since many museums around the world share a common and growing interest in using this technique for assessing their collections. As part of this STSM, the performance of two different instruments was evaluated by comparing the color changes registered when using the same experimental parameters.

The surface characteristics, i.e. color and photostability, of a reference set have been studied by this spectroscopic method. The reproducibility of the data, which is an important aspect of this COSCH action, was assessed by comparing the results generated by two different instruments, one in each laboratory. The reference samples were designed to explore common situations and challenges found in the analysis of museum objects. Moreover, the photostability of Blue Wool (BW) standards 1-3 was also measured with the aim of comparing the fading rates obtained for each reference material with those obtained for the BW set. The BW material is ISO standardized for the evaluation of photostability with BW 3 the most and BW 1 the least stable.

Microfade testing data obtained for seven reference materials, using a 10-minute exposure to an estimated spot illumination of 3.0 Mlx, were compared. It was observed that samples S2, S4, and S6 showed higher fading rates with final ΔE^* values, which were higher than 2 units. Although the color change experienced by an object having comparable sensitivity to samples S2 and S6 might be difficult to discern by the human eye, it is clear that a change such as the one recorded for S4 would be perceptible in a CH object. Four samples namely S1, S3, S5, and S7 showed higher stability with ΔE^* values that remained below 1. It was found that the most light sensitive materials (BW 1-2 range) always gave a higher response for the instrument in Berlin (RRL) relative to the one in Krakow (MNK). The opposite effect

was observed at the lower sensitivity end (BW3). Samples with photostability remaining in the BW2-BW3 range seem to be more affected by the light source installed in the MNK instrument. Explanations for these differences are the subject of our ongoing research.

The results achieved through this STSM have provided an opportunity for strengthening the methodological and theoretical aspects used in the analytical framework of our common work. In summary, the work derived from this STSM and any further collaborative project between the two institutions involved will definitely provide an additional and necessary approach to the COST TD1201 Action goals. The two institutions involved believed that the data generated by microfading testers can really complement the documentation of CH objects by offering a new dimension of knowledge in terms of aging processes and photostability of colorants found in museum materials. In addition, understanding the surface of colored CH materials in terms of their degradation is one of the key areas of the Action. Therefore, these results can be of value when describing an object's potential long-term behavior under museum exhibition conditions.



Microfading curve