Virtual restoration of faded colours of museums artefacts using LED lighting
Françoise Viénot, Centre de Recherche sur la Conservation des Collections, Muséum national d’Histoire naturelle, Paris, France

Whereas, for museum exhibition, it is recommended to illuminate artifacts with a distribution of light that covers the full spectrum to achieve fine discrimination of shades, it may be of interest to enhance the colourfulness of some faded artefacts. A procedure is presented to enhance the colourfulness of faded artefacts, based on adjusting the spectral profile of the light while maintaining a given white colour of the illumination.

The intensity of the three components of four feasible colour LED clusters was computed in order to produce white illumination metameric to a white LED light source taken as a reference. Colorimetric calculations were performed to model the colour changes undergone by target colour samples using illumination based on colour LED association with respect to the white LED reference. The model was based on CIELAB specification and allowed to optimize the choice of three colour LED associations that modify the hue and the saturation of a few target colour areas of illuminated samples while other areas are left moderately desaturated.

An experimental visual validation was practically obtained by adjusting the intensity of five calibrated colour LED, blue, cyan, green, amber and red, accommodated in a light booth. The visual validation was conducted asking twenty observers to rate the colourfulness appearance of a series of aged InkJet prints under every LED cluster with respect to the colourfulness of their original counterparts under the reference white LED source. The visual assessments agreed with the colorimetric predictions.

The demonstration could be made of the feasibility of the method by simulating in a light booth the rejuvenated appearance of a natural history specimen of which the museum possesses two differently aged items.