

Innovative packaging solutions for storage and conservation of 20th century cultural heritage of artefacts based on cellulose derivative

Paola de Polo Saibanti,
Fratelli Alinari IDEA SpA and Nemosine Project

“We all die, but looking” is the title of the autobiography of Alberto García Alix, one of the most representative photographers of 2nd half of 20th Century in Europe. It is impossible summarize better, in a few words, the relevance of the natural capability of human being of catching everything that surrounds him. The human flair of converting images into memories contribute on building what we were, what we are and surely what we will be. Since last 1895 the memories of history of human being has being helped by the possibility of capturing and saving this part of our evolution into photographs and movies. These physical supports have saved main part of our global cultural, social and political history. But, looking into each individual, also gave the possibility of recording part of our family heritage. Photographs and movies have helped to preserve the cultural material that is faithful witness of socio-cultural European evolution in the recent era. It encompasses not only the possibility to understand the development of new arts such as cinema, photography or graphic arts but also the preservation of the socio-cultural memories of citizens in major museums, local museums (real testimony of the history of cities and their people) located in many towns worldwide & in a huge number of private collections. A huge percentage of the recent European cultural heritage (CH) can be found in movies, photographs, posters and slides produced between 1895 to nowadays were made using cellulose derivatives. More than 75 years of visual and audio memories are up to now in serious danger to be lost due to the natural instability cellulose acetate (CA) and cellulose nitrate (CN) materials. **The worldwide estimation of such holdings within professional film archives is around 18 Mio of film reels on cellulose acetate, whereof ca. 5% are in a critical stage or showing signs of vinegar syndrome** (survey carried out by the OEAW-PhA in 2012, performed with 20 institutions, extrapolated to 125 members of FIAF (Fédération Internationale des Archives du Film)).

There have had other technical approaches to solve this real problem that follow the line of replication and copy the original ones in modern digital supports (for example PIQLBox©- www.piq.com/). But, they do not give the possibility of a real preservation of the original ones. In the actual technology age, our duty, with the people that preceded us, pass through help on the preservation of these parts of original memories that built our past history and will help on understanding our future. Under the technical point of view, conservators consider two approaches when planning treatments to extend the useful lifetime of cultural materials: preventive or passive and active or interventive. However in the case of cellulose derivatives and other components of the movie or photography, once initiated, degradation cannot be prevented, reversed or stopped, but only inhibited or slowed. Inhibitive conservation of cellulose derivatives can either involve the removal or reduction of factors causing degradation including light, oxygen, acids, fungus and relative humidity, or of any breakdown products which accelerate degradation, as well as cost-sensitive processes such as freeze. The cellulose derivative degradations is autocatalytic increasing constantly the level of degradation with the time.

NEMOSINE (www.nemosineproject.eu) aims to improve the traditional storage solutions, such as freeze storage (below 5°C), by developing an **innovative smart package** with the main goal of **energy saving and extent conservation time of cultural objects based on cellulose derivatives**. Beyond the state of the art

NEMOSINE plans to develop the following modular and integrated products: i)High O₂ barrier and Active packaging using non-odour additives, ii)Active acid adsorbers based on functionalized Metal Organic Framework (MOFs) integrated in low density and porous structures, iii)Gas detection sensors based on nanotechnology to monitoring AA, water, O₂ & NO, iv) Multi-scale modelling to correlate

degradation & sensors signals for maintenance prediction and integrate all these technologies in v)Packaging with modular design to fulfil the technical & economical requirements of the different CH made by cellulose derivatives and vi) Curative packages containing controlled release of natural antifungal additives. The main targets of NEMOSINE project are *cellulose derivatives, from photographic, movies and audio substrates*.