

Cellulose acetate in works of art: exploring the causes of its degradation

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Dans la Plage and *Relevo Laranja* are two artworks on cellulose acetate (CA) dated from the 1960s by the Portuguese artist José Escada. They are both compositions of symmetric modules in CA sheets that have been folded and cut in different shapes. Being displayed vertically as paintings, their three-dimensional character allows the perception of various shapes and shades of colour, depending on the perspective of the spectator.

Dans la Plage (1968), currently in Museu Nacional de Arte Contemporânea in Chiado, is constituted by yellow and white modules, supported by a large orange sheet. On the other hand, *Relevo Laranja* (1966), which was previously part of Galeria 111 collection, is constituted only by orange modules glued on a sheet of the same material. Although both artworks are composed by CA, purchased, according to Lourdes Castro, in a store named *Micap* in Paris by the artist in the same period (c. 1960s), their condition is quite different. *Relevo Laranja* presents warping, shrinkage and hardening of the plastic material which suggest the occurrence of degradation at a molecular level, not detected in *Dans la Plage* [1].

To understand the causes of degradation in *Relevo Laranja*, a molecular characterization of the polymer and additives has been carried out with the aim to find out if the composition is related to the artworks condition.

One of the major causes of degradation of CA is ester hydrolysis that will lead to the loss of physical properties. In this work, infrared spectroscopy will be used to assess the extent of hydrolysis, and the original substitution degree will be discussed [2,3].

Because of the difference in the artworks current condition, it will be interesting to explore the origin of the CA sheets. Was *Micap* the only store where Escada bought the materials? Were both produced by the same manufacturer? If not, did the manufacture had any role on the material degradation? Also, the two artworks have different histories. Was their history a factor that contributed to both degradation states? Did the other elements in both artworks have any influence on their current state?

This study will allow us to discuss the degradation rate and its causes from both internal (e.g. original substitution degree, plasticizers, colorants) and/or external factors (e.g. relative humidity, temperature, other constituent materials).

Keywords: contemporary artwork; cellulose acetate; material characterization; polymer degradation

[1] Babo, S. (2006). Estudo e Conservação da obra *Dans la Plage* de José Escada. Relatório de Estágio, Faculdade de Ciências e Tecnologia - Universidade NOVA de Lisboa.

[2] Littlejohn et al. (2013), *Investigation of the degradation of cellulose acetate museum artefacts*, Polym. Degrad. And Stab. 98, 416-424

[3] Samios et al. (1997), *Preparation, characterization and biodegradation studies on cellulose acetates with varying degrees of substitution*, Polymer, 38, 3045-3054