

Conservation studies on poly(methyl methacrylate): understanding the influence of industrial and artistic production processes on the degradation of Portuguese artworks with acrylic sheet

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Acrylic sheet, *i.e.* poly(methyl methacrylate) (PMMA), is a twentieth century plastic material that found worldwide applications including in art. PMMA is considered a very stable plastic and its main ageing mechanism, photooxidation, has been well studied. However, no systematic studies have been undertaken to fully characterize acrylic sheet used in works of art, which correlate the chemical and physical changes over time with an understanding of the influence of manufacture, transformation processes and conservation procedures. The aim of this project was to study these correlations and influences.

Artworks produced in PMMA sheets during the 1960s by two different Portuguese artists – Ângelo de Sousa (1938-2011) and Lourdes Castro (1930-) – have been selected as case studies. Their artworks were selected not just for their historical importance but also because the same material was used with different techniques, Lourdes Castro obtained the 2D shapes of her pieces by cutting with a electric saw and polishing the PMMA sheets, while Ângelo de Sousa used heat to cut and mould them in 3D forms. In addition, the PMMA they have used had also different origins: Lourdes Castro was living in Paris and worked mainly with acrylic sheets from the well-known brands *Plexiglas*® and *Altuglas*®, while Ângelo de Sousa used acrylic sheets purchased in Porto and likely produced by *Plásticos do Sado*, a small Portuguese company.

Would the material used by Lourdes Castro be of better quality than the one used by Ângelo de Sousa? Will the transformation processes applied by the artists influence the ageing of the artworks? To answer these questions an interdisciplinary approach has been followed: historical and technical information on the industrial production of acrylic sheet was collected; dated samples from both artists and different manufactures were characterized; reproduction of the artists' processes was tested; artificial ageing studies were conducted in selected samples; and photo-oxidative degradation mechanisms have been studied and correlated with changes in mechanical and thermophysical properties.

Furthermore, a survey concerning the presence and condition of acrylic sheet in the main Portuguese museums and collections has been carried out and organized in a database. This broader approach contributes to establish and understand the relationship between the material transformation process and its condition.

Some of the main outcomes of the project will be presented and discussed.