Treatment of Mink Stole's Iconic Glasses from *Pink Flamingos*

Introduction

In August 2023, the Academy Museum of Motion Pictures opened its exhibition *John Waters: Pope of Trash* (September 17, 2023 - August 4, 2024). The exhibition is the first comprehensive retrospective of John Waters' influential, decades-long career as a visual artist, author, and award-winning filmmaker, and comprises over 260 original objects from his life and films. These include costumes, awards, script pages, film posters, and one-of-a-kind movie props, such as Debbie Harry's exploding wig from *Hairspray* and the infamous lamb leg used as a murder weapon by Kathleen Turner in *Serial Mom*.

Props and costumes like these, designed for individual films, are often not made with longevity in mind. As is often the case with film props, their overall condition after ten, twenty, thirty years, is typically "fair" at best, owing to the instability of many plastics and adhesives over time.

More than forty-nine conservation treatments were completed for this exhibition -- the most challenging of them being a pair of 1970s cat eye frame glasses, decorated with sparkling silver rhinestones, worn by actor Mink Stole in John Waters's transgressive cult classic *Pink Flamingos* (1972).

The glasses were owned by Mink Stole herself, who in 2022 described their condition to curators Jenny He and Dara Jaffe, as "dust." Their condition was, indeed, very poor. However, their inclusion in the exhibition was deemed crucial as they were a signature component of Mink Stole's character, as well as being one of only a few items from the film still in existence.

The conservation treatment designed to repair and make these glasses exhibitable was challenging. Almost every step was fraught with questions and concerns, from identification of the original plastic to determining how the treatment would affect the materials long-term.

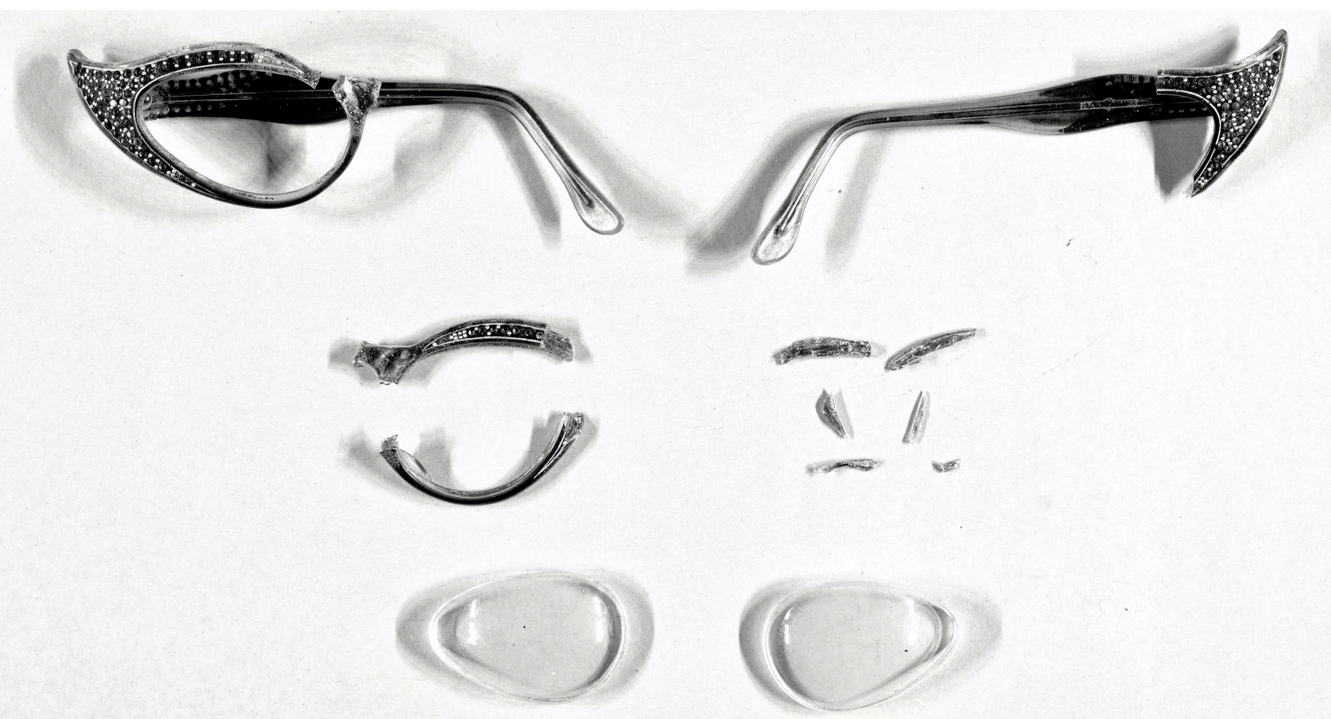
There were also concerns about using tactics that some of the limited research in plastics conservation discourages, including the use of heat, solvents, and water or humidification. Without a truly adequate number of publications or case studies on how to treat degraded plastics yet available, there was no established way to move forward.

Although none of the treatment techniques described below offer breakthrough methods, this article explains the complex issues that arose during the treatment,and the rationale used for moving forward successfully.

Condition

The glasses arrived at the Museum in several pieces. The plastic was broken in a handful of places and cleaving in either large strips, or in small layers, like onion skin. The cleaving portions of the frames were also distorted, each side pulling from the other in the opposite direction.

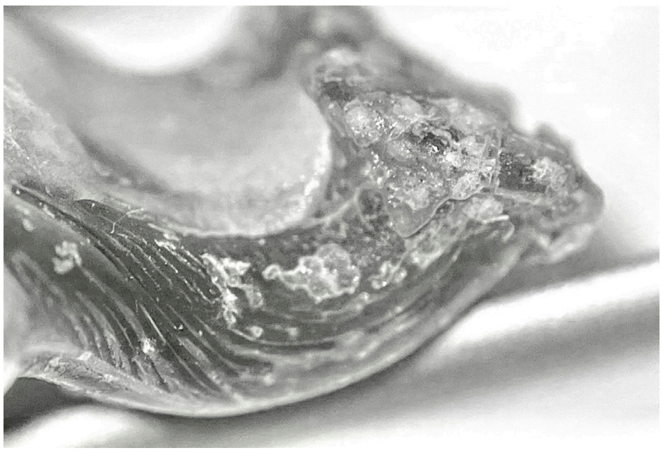
The plastic had tiny cracks and fissured throughout its structure. The frames had also shrunk overall, which likely caused some of the breaking and distortions and created a quarter inch gap on both sides of the frames.



Mink Stole glasses from *Pink Flamingos*, before treatment

by Sophie Hunter, Dr. Rebecca Ploeger, and Stephen Morrissey

The surface of the glasses was covered in a thick, solid, white layer of plasticizer that had leached onto the surface and hardened over time. There were crystalline, orange-colored accretions as well, most likely also a plasticizer. The metal portions – the hinge and temple armature – showed heavy copper corrosion. And to cap it all off, the glasses could not be handled, even in the gentlest way, without causing further cracks and breaks.



Delamination of cellulose acetate into layers on nose bridge of frames at 12.7x magnification

Cleaving and distortion of plastic in opposing directions

Analysis of Plastic

The first step in treatment was the identification of the plastic. Visually, the cracking pattern indicated that it might be cellulose acetate, as this type of delamination into small layers is characteristic of cellulose acetate degradation. By contrast cellulose nitrate, a plastic also commonly used to make glasses, often exhibits a square-like cracking pattern and thus was not deemed a likely contender (Oosten 2022).

x

Analysis was conducted using: Attenuated Total Reflectance Fourieraometer from Thermo Scientific; Reflection-FTIR (refl-FTIR) (Bruker Alpha FTIR with a reflection module (ALPHA-R); pyrolysis – gas chromatography - mass spectrometry (py-GC-MS) (Frontier Lab Multi-Shot Pyrolyzer 3030D); and with a microchemical test for nitrate (cellulose nitrate) using diphenylamine (Odegaard et al 2005).

FTIR analysis, in ATR and µ-transmission, was carried out on the degraded plastic. The resulting spectra was difficult to interpret, even with multiple cellulose acetate reference spectra available for comparison in the Academy's FTIR libraries.

The spectra revealed that the material may be cellulosic, however, and cellulose nitrate and acetate remained high probabilities. Reflection FTIR, which is non-invasive, was taken on a less degraded area and showed evidence of cellulose acetate, but still did not provide a clear spectrum.

Py-GC-MS identified the additives triphenyl phosphate and diethyl phthalate, two common plasticizers used with cellulose acetate (Oosten 2022), and the presence of acetic acid. Acetic acid was another good indication that the plastic was cellulose acetate, as acetic acid is a by-product of cellulose acetate degradation and thermal fragmentation during pyrolysis.

A microchemical test for nitrate using diphenylamine, was negative for nitrate. In summary, material analysis indicated that the composition of the eyeglass frames was plasticized cellulose acetate.

The analysis of such highly degraded polymers is typically complicated and challenging. Much of the collection at the Academy Museum contains degraded polymers of different types, and degraded polymer FTIR spectra can sometimes look completely different compared to their pristine/pure reference spectra.

As polymers chemically degrade, they can lose or add additional elements and/or undergo scission or crosslink reactions, changing their molecular structure and composition (Laganá et al 2022; Lavédrine et al 2012; Waentig 2008). Additives can also complicate spectral interpretation.

The Academy Museum has made a point to add degraded materials to its internal FTIR library and recently proposed that a degraded polymer spectral library be created within the IRUG database (Ploeger et al 2023). Identifying degraded polymers continues to be a major challenge for conservators, especially those who do not have the analytical equipment.

Treatment

To begin treatment, a method needed to be established to pick up and handle the frames without breaking them into tiny pieces. A solution was found in the use of cyclododecane.

Since cyclododecane is used by melting the waxy solid and applying it hot, there was a concern about heat affecting the surface texture and sheen of the glossy frames (Laganá et al 2022). Small areas were tested under a Leica M651 stereomicroscope with no damage observed. One side of the frames were coated in the material, so that the glasses could be safely turned over, consolidated, and cleaned. After about seven days, the cyclododecane sublimated, allowing for the glasses to be flipped again, coated in the material, and for the opposite side to be consolidated.

The thick layer of white, hardened plasticizer was removed using a pH adjusted aqueous solution with a surfactant, developed with the help of the Modular Cleaning Program (Stavroudis 2020).

Like the use of heat above, the use of water on cellulose acetate plastic is generally discouraged. Cellulose acetate is considered to have high water absorption properties and has been known to cause crazing and warping in some treatments (Lavédrine et al 2012; Shashoua 2008; Waentig 2008).

The cleaning treatment was done under the microscope, using a lightly dampened swab, and by limiting contact with the clean plastic to ensure liquid wasn't allowed to migrate into the cracks within the frames. The adjusted solution was highly effective at solubilizing and picking up the plasticizer, revealing a still glossy, translucent plastic underneath. There were a few requirements for choosing a consolidant and adhesive for repair: a fast-setting time, translucency,

Glasses, before and after cleaning of hardened plasticizer on surface

ability to be dyed or pigmented, high wicking properties, strength (to correct distortions), and reversibility for large reattachments that required alignment around the lenses.

Although HXTAL would have created beautiful, seamless repairs, its drying time ruled it out, as the glasses were too fragile to be clamped or secured in portions. Paraloid B-72 was selected, as it met all the criteria. In fact, the delamination of the cellulose acetate into thin layers like onion skin was reminiscent of some archaeological glass that has thin, lifting, weathering layers. These can be treated by wicking dilute Paraloid B-72 into the structure to strengthen and bind them together (Koob 2006).

The reservations about using Paraloid B-72 were centered on the use of acetone as its solvent. Acetone and solvents, in general, can damage some cellulose acetate, causing it to swell, potentially solubilize, and/or lift colorant (Lavédrine et al 2012; Oosten 2022; Shashoua 2008; Waentig 2008).

A polymer will dissolve in a solvent when their solubility parameters are similar. The solubility parameter of a particular polymer, however, can be affected by plasticizers and other additives they may include, as well as their degree of degradation (Chiantore et al 2012; Lavédrine et al 2012), since intermolecular forces, polarity, and overall surface energy can change as the polymer degrades.

This is the case for cellulose acetate, which can degrade to become more similar to cellulose. Small tests with acetone were performed under a microscope, and showed no indication that the acetone was swelling or further damaging the surface. Isopropanol and ethanol, by contrast, swelled and lifted colorant immediately from some self-sampled detached pieces. Thus, Paraloid B-72 in acetone was wicked into the glasses, filling spaces throughout the cracked structure and making the glasses appear overall more translucent and stable. This was done while they were held together with cyclododecane.

After consolidation, the various pieces of the frames were re-aligned and adhered back together. To align the pieces in a manner that would allow the lenses to be re-inserted, dental wax was used to mold and cast replicas of the lenses, providing a model structure to align the frame pieces around. This also ensured that broken bits of the frames would not stick to the original lenses if adhesive leaked out of the cracks during the restoration process.

A number of different, delicate clamping methods were used while the Paraloid B-72 dried. For the smallest and lighter-weight parts, cyclododecane was used as a clamp. In other cases, a splint was made with cut acupuncture needles, glued to each side of the break edge with Paraloid B-72.

Large distortions were pulled back into place around the molded wax lenses using string and then glued using Paraloid B-72.

After these repairs, the original lenses were able to be popped back into place. The many cracks and areas of loss to the eyeglass frames were filled, again using B-72, bulked with microballoons and dyed-to-match using Orasol® dyes.

As mentioned, the shape of the frames had changed due to shrinkage and distortion from degradation, and each side had a quarter inch gap that could not be reconnected. Thus, the lenses did not perfectly fit into the frames after being reinserted.

To stabilize and keep the lenses in place, the gaps were filled in two layers to mimic the layers of the glasses – a thicker, yellow layer on the back, and a very thin, olive-green layer on the front surface.

Treatment of Mink Stole's Iconic Glasses from *Pink Flamingos,* continued

To achieve the two-layered, duel colored fill, the thin green layer was recreated using dental wax, as a place holder (Russell 2003), while the back yellow layer was recreated using Paraloid B-72, bulked with microballoons and pigmented to match using Orasol® dyes. The wax was then removed, and the thin layer recreated using dyed Paraloid B-72, cast into thin sheets, cut to size and adhered over the yellow fill layer. To obtain the best match, pigmented wax resin was used in some areas of the fill to create the final desired effect.

After the frames were pieced together, the final repair was to the nose bridge. The bridge was heavily distorted and had the heaviest buildup of plasticizer. Being the bridge, it also required the strongest adhesive and bond to maintain the structure of the eyeglasses for handling.

With two days until installation, HXTAL was not an option for this repair. The bridge was reconnected using Paraloid B-72 and milliput® epoxy putty and painted using acrylics. The milliput® was a non-ideal solution, as it is not translucent and would be a blemish (if not an eyesore) if the glasses were viewed from behind during the exhibition.

The day before install, the milliput® repair failed, and a metal bridge was created by the mount-making team that was adhered behind the fill to connect both sides of the frames. For an unknown reason, Paraloid B-72, would not bond sufficiently to the surface of the plastic around the bridge of the nose, and the metal bridge repair could not be trusted to maintain the central structure.

Thus, to display the glasses safely, a final treatment step was needed – to build a supportive mount to take the stress off the nose bridge. However, because of the extreme brittleness of the degraded cellulose acetate, very little pressure could be applied by the mount to any other areas of the glasses, as it would cause them to break if twerked even slightly.

Designing and implementing the mount for the Mink Stole glasses was an exercise in collaboration and patience. The fabrication and conservation teams decided to use both brass and steel for this mount, which would ensure rigidity where needed and flexibility in the appropriate areas. The mount was a hybrid between a leverage and contour mount with small removable clips held on with 4-40 button head screws.

Additionally, two small supports made of thin gauge steel rods were made to sit underneath the glasses to support the weight of the lenses. This portion of the mount was designed the morning of install when it was suspected the nose bridge repair might not hold. The rods had to be installed at just the right height to distribute some of the load, while not stressing the repair at the bridge of the glasses.

Mink Stole glasses, after treatment and installed in *John Waters: Pope of Trash* exhibition at the Academy Museum

Post-exhibition, the nose bridge repair can be redone using HXTAL in hopes that it will bond sufficiently to allow the glasses to be handled safely without a mount.

Conclusion

Although the treatment had a limited timeline and was not perfect, it was a valuable learning experience for the conservation and fabrication team at the Academy Museum.

There is no recipe for treating plastics and polymers that can be applied across the board, as is shown in the handful of published case studies for treating cellulose acetate objects, in which plastic responded to heat, solvents, and water differently depending on its additives, construction, and level of degradation (Chiantore et al 2012; Laganá et al 2022; Lavédrine et al 2012; Shashoua 2008; Waentig 2008).

Through judgement, observation, analysis, and testing, the treatment of Mink Stole's glasses from *Pink Flamingos* will extend the lifespan of the glasses, making them exhibitable in the future. It will make an interesting case study for observation regarding how the treatment holds up over time in relation to the original plastic, which will likely continue to degrade around the fills and repairs.

As a fitting and rewarding conclusion to the conservation efforts that led to the opening of the John Waters exhibition, Mink Stole donated the glasses to the Museum's permanent collection. A big thanks to her and the Academy!

Experimental

Fourier Transform Infrared Spectroscopy – µ-transmission (µ-trans FTIR): Infrared spectra were collected using a Continuum microscope coupled to a Nicolet 6700 FTIR spectrometer (Thermo Scientific). Samples were prepared by flattening them in a diamond compression cell (Thermo Spectra Tech), removing the top diamond window, and analyzing the thin film in transmission mode on the bottom diamond window (2 mm x 2 mm surface area). An approximately 100 mm x 100 mm square microscope aperture was used to isolate the sample area for analysis. The spectra are the average of 64 scans at 4 cm^{-1} spectral resolution.

Fourier Transform Infrared Spectroscopy – attenuated total reflectance (ATR-FTIR): Infrared spectra were collected using a Bruker Alpha II FTIR with an ATR module. The spectra are the average of 24 scans at 4 cm^{-1} spectral resolution.

Fourier Transform Infrared Spectroscopy – reflection (Refl-FTIR): Infrared spectra were collected using a Bruker Alpha FTIR with a reflection module (ALPHA-R). The spectra are the average of 32 scans at 4 cm^{-1} spectral resolution.

Pyrolysis – Gas Chromatography – Mass Spectrometry (Py-GC-MS): A Frontier Lab Py-3030 double-shot pyrolyzer system was used for pyrolysis, and the pyrolysis interface was maintained at 320 ^{o}C. The pyrolyzer was interfaced to an Agilent Technologies 7820A gas chromatograph coupled to a 5975 quadrupole mass spectrometer. An Agilent J&W DB-5MS UI column (30 m length x 0.25 mm i.d. x 0.25µm film thickness) was used for the separation with ultra-high purity helium (UHPHe) as the carrier gas set to 1 mL/min. The split injector was set to 320 ^{o}C with a split ratio of 20:1. The GC oven temperature program was 50 ^{o}C for 2 minutes, ramped up to 300 ^{o}C at 10 ^{o}C per minute, followed by a 5 minute isothermal period, with an initial solvent delay of 2 minutes. The MS transfer line was at 320 ^{o}C, the source at 250 ^{o}C, and the MS quadrupole at 150 ^{o}C. The mass spectrometer was scanned from 33-600 amu at a rate of 2.59 scans per second. The electron multiplier was set to the autotune value. Samples were placed into a 50 µL stainless steel Eco-cup. Afterwards, an Eco-stick was fitted into the cup, and the cup was placed into the pyrolysis interface where it was purged with He for 3 minutes. Samples were pyrolyzed using a single-shot method at 600 ^{o}C for 10 seconds.

Microchemical test: the "Test for nitrate (cellulose nitrate) using diphenylamine" (Odegaard, et al 2005) was used to identify the possibility cellulose nitrate.

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Annual Meeting Abstracts

The 2023 WAAC Annual Meeting

was held in Houston, Texas

November 6-8

The presentations from the meeting are listed below along with summaries prepared by the speakers.

The Sensate Gaze

Karen L. Schiff

I began making Laid Line Drawings in the summer of 2006, partly in response to the gorgeous papers I had seen less than a year before in the Metropolitan Museum of Art's exhibition "Vincent van Gogh: The Drawings" (October 18 – December 31, 2005). But the project emerged just as much in response to a cheap pad of paper I came across in a Wyoming Wal-Mart. This brief talk will focus on the ways that I use drawing to articulate the material qualities of manufactured laid papers, first by Aquabee and later by Fabriano, with the goal of discovering more about them, while along the way creating visual and conceptual intrigue. Looking sensitively at these papers is the first step toward perceiving and drawing out (so to speak) the quiddity of a thing, the tidbits of wonder lurking in even in mass-produced, everyday materials.

Endnotes

1. Cyclododecane, a white, waxy cyclic alkane, available at Kremer Pigmente GmbH & Co. KG

2. 1.1% (0.5M) MES sodium hydroxide pH 5.5./ .5% Ecosurf EH-6 ™/ deionized water

3. HXTAL NYL-1 Epoxy Adhesive Part A-B, epoxy, available at Talas

4. Paraloid B-72, an ethyl methacrylate copolymer resin, DOW Chemical Company)

5. 3M glass bubbles K25, 3M Company

6. Orasol dyes, Ciba-Geigy

7. Pigmented wax resin, Gamblin

8. Milliput, two-part epoxy putty, Mil-

Complexity of Vision, Consistency of Intent: The Art of Jay DeFeo

Karen Zukor

As a contemporary artist (1929-1989), Jay DeFeo was a singular figure in the San Francisco Bay Area. Her use of materials was wildly inventive and is evident in her drawing, painting, sculpture, collage, & jewelry. But 60 to 90 years later, her work presents a conundrum as to what was her intent and what is the result of neglect and poor storage. Conserving her work is a challenge – what did DeFeo intend and how does her work (literally) hold up?

Treatment of Mink Stole's Iconic Glasses from Pink Flamingos

Sophie Hunter and Dr. Rebecca Ploeger

In John Waters' 1972 black comedy film Pink Flamingos, the actor Mink Stole plays the antagonist Connie Marble, who battles Divine for the title of "filthiest person alive!" Her character is perhaps most recognizable by her glasses, a pair of 1970s cat-eye frames, decorated in sparkling silver rhinestones. The glasses were also one of the few remaining objects still in existence from this iconic cult film, and thus deemed critical to include in the current exhibition, "John Waters: Pope of Trash" by the curatorial team.

Unfortunately, the glasses, with their mainly cellulose acetate frames, were in very poor condition, having reached advanced stages of plastic degradation. The eyeglass frames were broken into several pieces and brittle and cracked throughout; their entire surface covered in a thick layer of leached plasticizer, which was hardened and blanched; their shape deformed from shrinkage; and the lenses had fallen out. The glasses could not be handled, as even the slightest amount of pressure would cause them to break anew. Mink Stole, who agreed to loan them to the Museum, described them to the curators as "dust."

This presentation will discuss the analysis and treatment of the glasses, including the use of cyclododecane to make them stable enough to handle, the cleaning and consolidation methods used, and the restoration of the lost areas. With the help of a supportive mount, the glasses are currently on display at the Academy where visitors can now recognize them as the movie prop that helped to create the Mink Stole character we know and love. Mink Stole has since generously donated the glasses to the Academy Museum due to the extensive conservation work that was carried out. (see page 24 for complete article.)

Conservation Considerations for Cast Ductile Iron Sculpture - Beverly Pepper's Moline Markers

Abigail Rodriguez

In the early 1980s, American sculptor Beverly Pepper became the first known artist to work with ductile cast iron. This groundbreaking work was completed in collaboration with the John Deere Foundry in East Moline, Illinois, and the Davenport Art Gallery of Davenport, Iowa. The sculptures created during this period are collectively referred to as the "Moline Markers" and include thirteen distinct vertical forms ranging in height from 9 1⁄2 to 24 feet.

Three of these sculptures are in The Fine Arts Museums of San Francisco (FASMF) collections, on display in the Barbro Osher Sculpture Garden at the de Young Museum. Two of the three sculptures exhibit structural condition issues and all three have heavy wear and alteration to their patinas. The structural issues include slight deformation of the vertical elements and subsequent failure of a spot weld.

This research is multi-pronged, aiming to develop treatment protocols for both the structural condition issues and restoration of the patina on the FAMSF sculptures. As Pepper was known for pushing the limitations of sculptural materials, the development of a structural treatment plan for these works will include consultation with foundries, metallurgists, and structural engineers. Foundational work on this project will also include the assessment of several other "Moline Markers" across the United States, compiling past treatment methodologies to inform conservation considerations for monumental cast ductile iron sculpture. Colorimetry and spectrophotometry will be used to capture information about Pepper's intended patina.