Article: Animation Cels: Conservation and Storage Issues (Abstract)
Author(s): Kristen McCormick, Michael R. Schilling, Miriam Truffa Giachet, Joy Mazurek, Herant Khanjian, and Tom Learner
Topics in Photographic Preservation, Volume 16.
Pages: 103-104
Compiler: Jessica Keister

Topics in Photographic Preservation is published biannually by the Photographic Materials Group (PMG) of the American Institute for Conservation (AIC). A membership benefit of the Photographic Materials Group, *Topics in Photographic Preservation* is primarily comprised of papers presented at PMG meetings and is intended to inform and educate conservation-related disciplines.

Animation Cels: Conservation and Storage Issues

Kristen McCormick, Michael R. Schilling, Miriam Truffa Giachet, Joy Mazurek, Herant Khanjian, and Tom Learner

Presented at the Objects/RATS joint session of the 2014 AIC Annual Meeting in San Francisco, California.

This paper presents the results of collaborative research undertaken to study the technical properties, degradation, and preservation of animation cels. Traditional animation came about in the early 20th century and by the end of the same century was disappearing with the introduction of the digital age and digitally-created animated films. Left behind is an art form that holds the characters of our childhood: Pinocchio, Cinderella, Snow White – painted on thin transparent polymer sheets of cellulose esters such as cellulose nitrate, cellulose acetate and more recently polyester. These plastic sheets, known as "cels", are the artwork that was then photographed to make the animated films.

Animation cels present conservators and scientists with a host of challenges, such as buckling, yellowing and off-gassing of the plastic due to hydrolysis and oxidation, whereas the gum-based paints are prone to cracking, flaking and delamination. Cellulose ester photographic films are stored in very cold environments to slow deterioration rates, but it is not clear that these conditions would be safe for animation cels painted with gum-based paints, because colder storage may be detrimental to the paints. Another challenge is assessing whether pollutant sorbents would be beneficial for removing off-gassed products. Would microchambers such as passé-partout mounts minimize or exacerbate the impact of fluctuating external environments? Additionally, the paints and plastic sheets may respond differently to the storage conditions, resulting in delaminating and flaking of the paints. Finally, research into flaking and delamination is sorely needed to aid in developing a proven method of reattaching paint while retaining the integrity of the work.

With little systematic investigation in this area, and a significant collection of American cultural history at risk, collaborative research was undertaken to begin examining the properties and dynamics of this medium. Disney's large collection of cels, the diversity of production years (1930's to 1980's) and the various cellulose materials provided ample sampling material for this study. The collection includes cels stored in uncontrolled environments, as well as cels stored between 62-65 °F.

Characterization of the cels by multiple instrumental techniques to assess polymer composition, aging behavior and plasticizer distribution was a critical part of the initial phase of this research. Identification of polymer type using Fourier-transform infrared spectrometry (FTIR) was helpful for differentiating cellulose nitrate cels from those made from cellulose diacetate, cellulose triacetate and polyester, because visual classification of cels is not always accurate. Pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS) revealed unique plasticizer mixtures in the diacetate and triacetate cels, and evidence of hydrolysis of the acetate polymer and phthalate plasticizers. Estimates of the degree of acetylation by portable FTIR, bench-top FTIR and

GC/MS were compared in order to assess the accuracy of the measurements and the suitability of non-invasive FTIR. Finally, the volatiles trapped inside the passé-partout mounts were studied by GC/MS in order to determine the usefulness of this storage method.

Animation cels represent an important and unique cultural legacy of the 20th century. Undoubtedly, the key preservation issue is finding the optimal environment to decelerate the degradation of this material. Further research towards that end is planned, building upon this analytical investigation.

Kristen McCormick
Manager of Art Collections and Exhibitions
Walt Disney Animation Research Library

Michael R. Schilling, Miriam Truffa Giachet, Joy Mazurek,
Herant Khanjian, and Tom Learner
Getty Conservation Institute