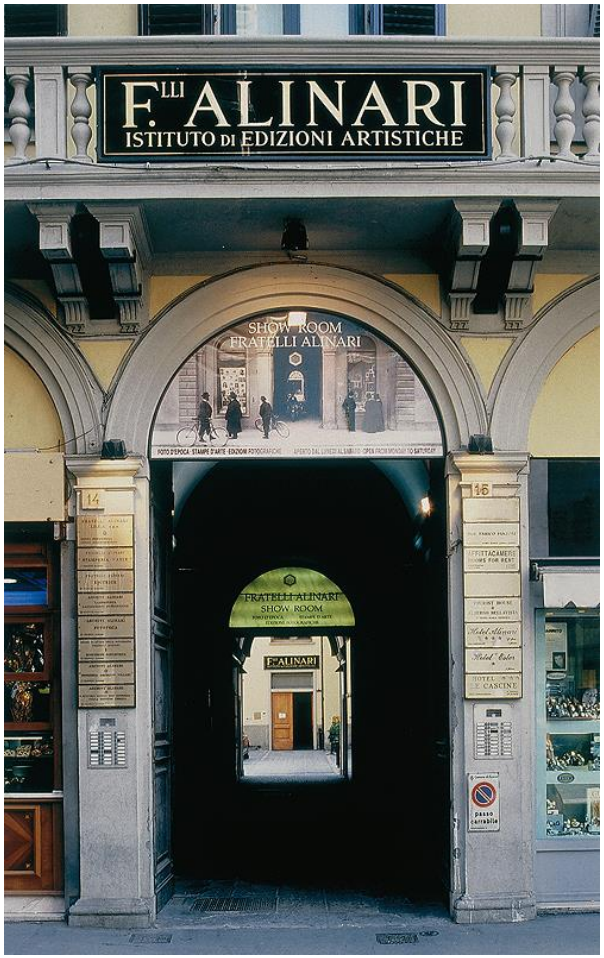
FRATELLI ALINARI
Fondazione per la Storia della Fotografia

The training and conservation projects about photographic materials: the experience of Alinari

Fratelli Alinari. Fondazione per la Storia della Fotografia,
Florence, Italy
Emanuela Sesti

Conference: **Binding design and paper conservation of antique books, albums and documents /BBinding/**
Sofia, 19th September 2014


AFI
ALI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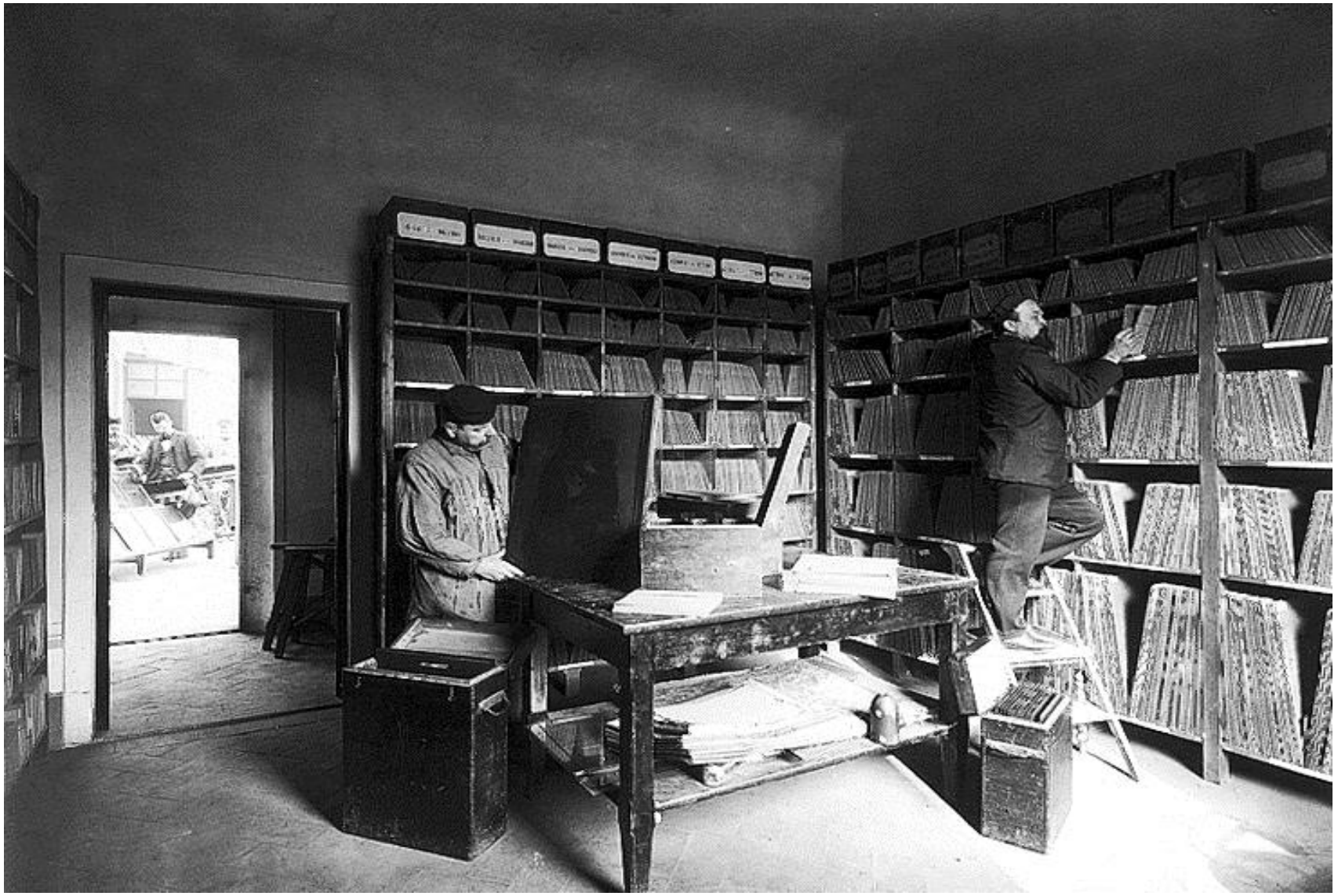
DELLA FOTOGRAFIA

- **Fratelli Alinari was founded in 1852 and has a collection of more than 5,000,000 photographic materials, its archive is known worldwide and since 1998 has founded in collaboration with the Opificio delle Pietre Dure in Florence the Restoration Laboratory of Photography, as well as organizes advanced training courses on the conservation and restoration of photography. I wish therefore present our collections and the last intervention project on the conservation and restoration of photographic materials, in particular those most at greater risk of degradation, nitrate and acetate films. The project has already started, after a year of study in our archive, and the result will be presented in this conference.**

Conservation




108.A
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Orto speciali
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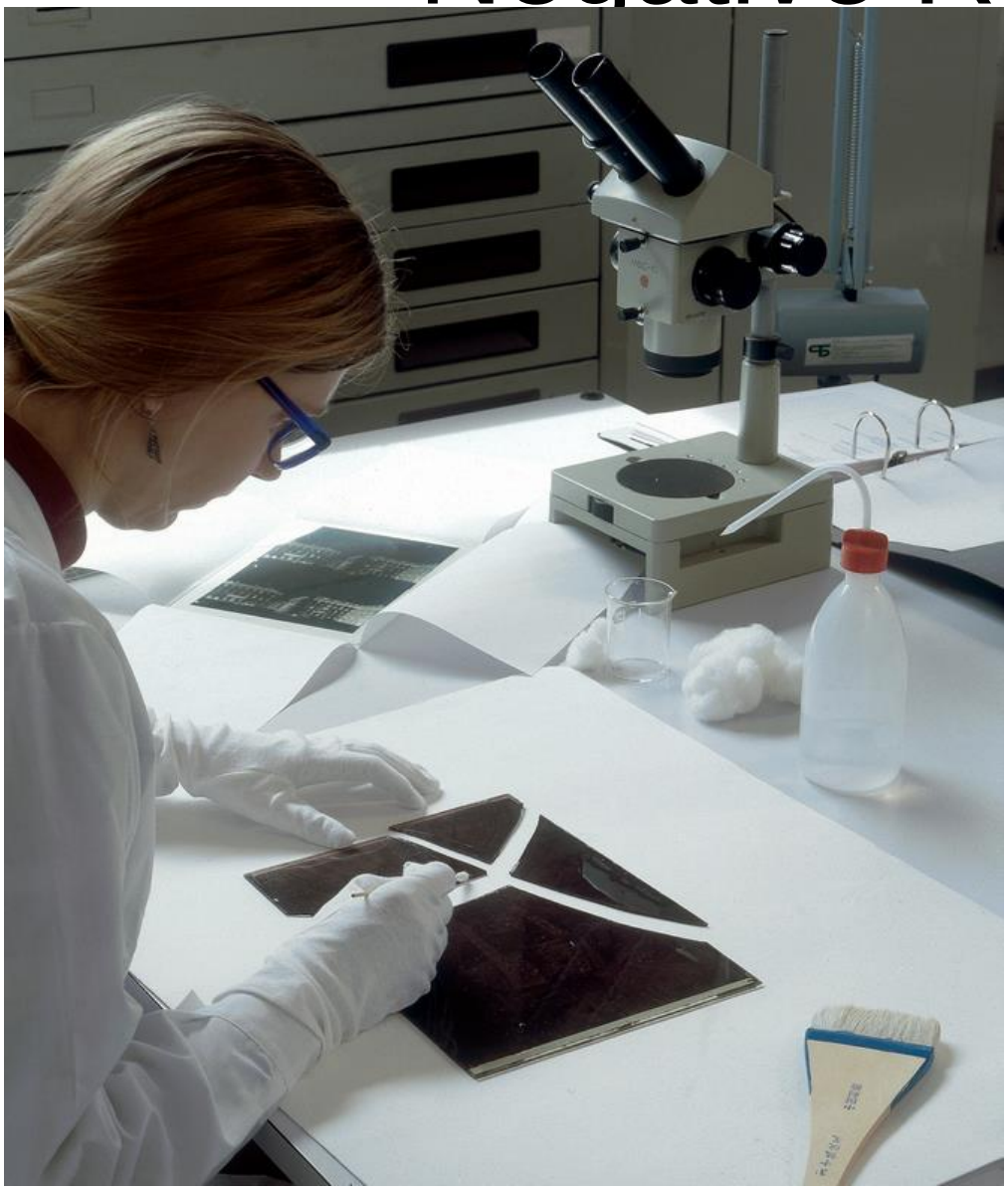
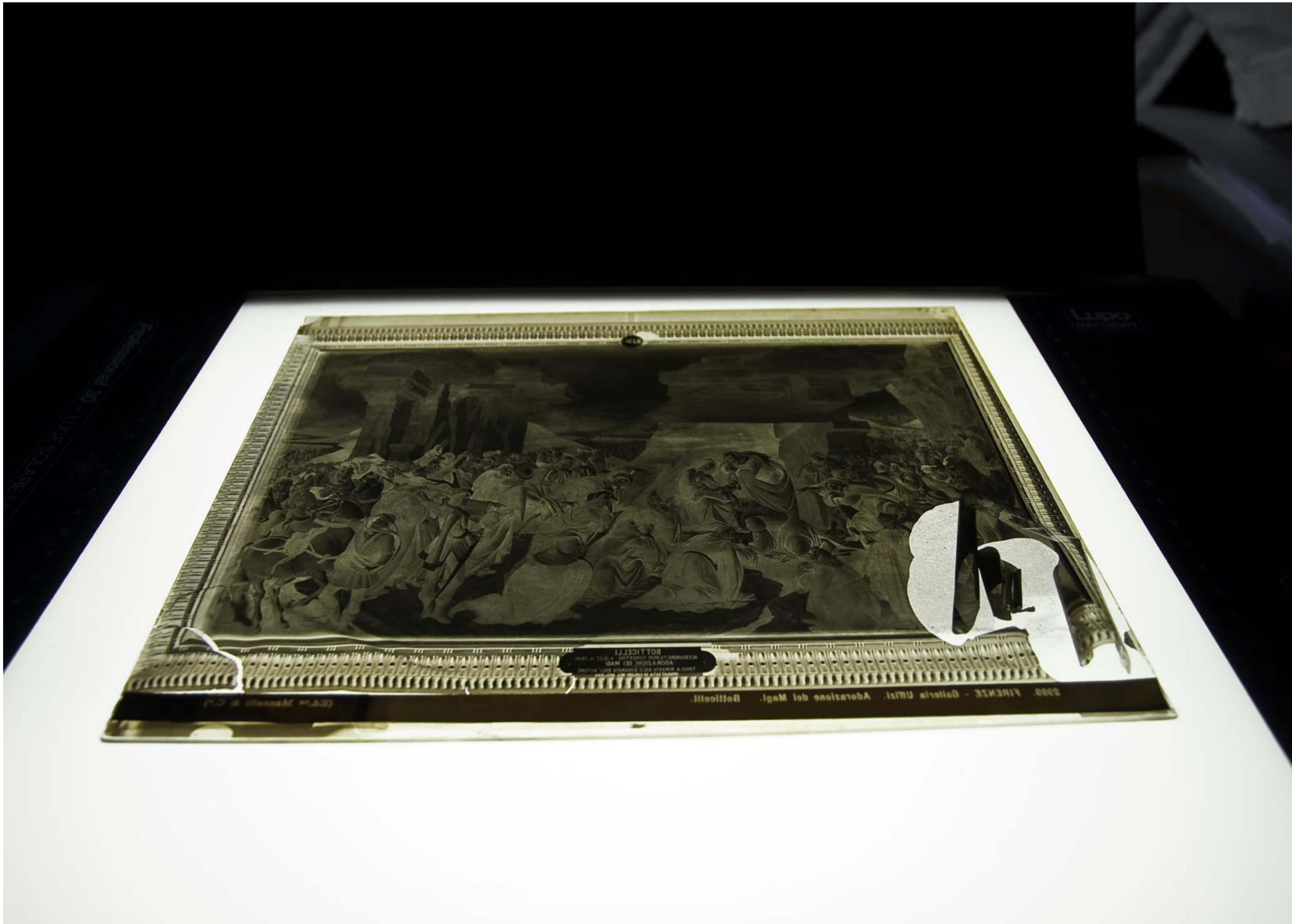
P4

Negative Restore




da Vinci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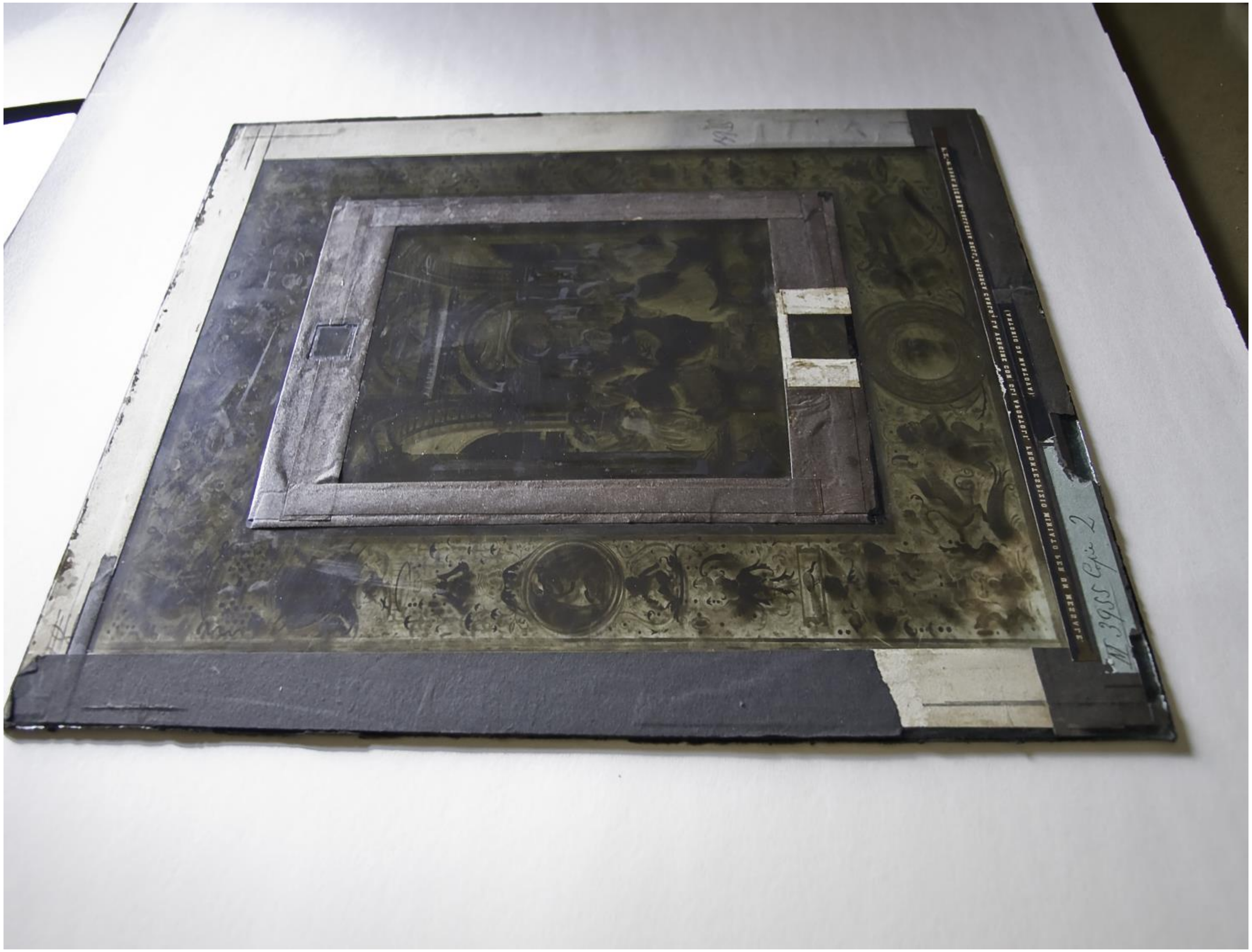



DOTT. ALESSANDRO BIZZI
TELEFONO 21.13.60
TRIELINA
ACETONE

Alinari workshop

- Collaboration with Opificio delle Pietre Dure- MiBac – Ministero per i Beni e le attività culturali – the most important center of restoration in Italy and known worldwide
- Collaboration with Atelier de Restauration et Conservation de la Ville de Paris (ARCP)
- Collaboration with Istituto Nazionale per la Grafica, Rome, Mibac

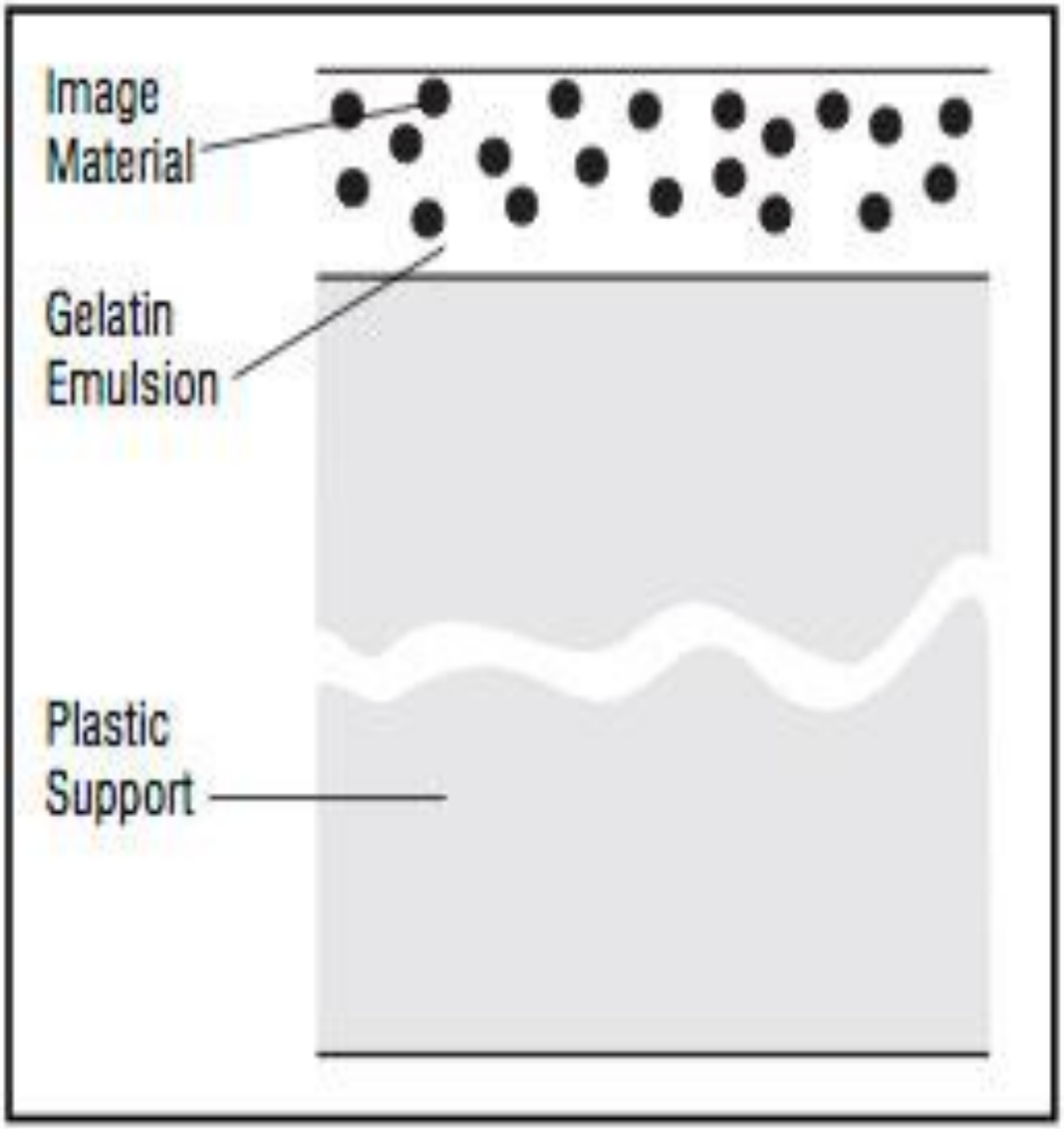
Alinari Courses

- Conservation and Restore photography
- Photoarchives Management
- Conservation and Restoration Paper
- Specialization Courses

Film negative project

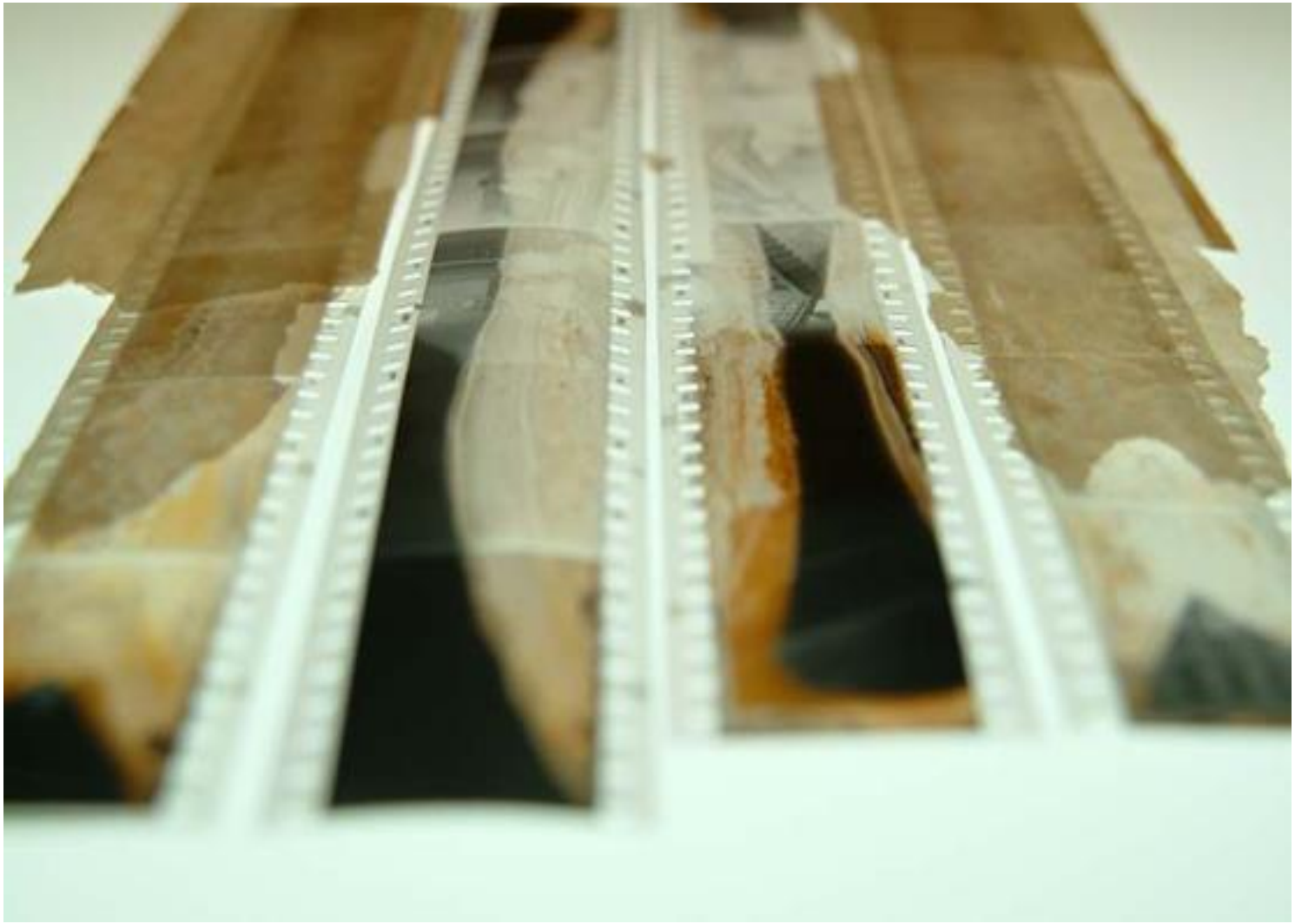
- During 2013 with the Opificio delle Pietre Dure (Cultural Heritage Ministery) and Art Defender (Italian Company dedicated at the art preservation), Alinari worked on a project to preserve negative on nitrate and acetate film, the part of the archive at greater risk of degradation.

Film negative



Cellulose Nitrate

- first use of film negatives
- 1888: With the invention of the hand camera of George Eastman was necessary to produce a flexible support that it could also be rolled up.
- Already in 1846 a Swiss chemist Christian Friedrich Schönbein invents the product based on cotton which will serve hereinafter for the manufacture of films: cellulose nitrate, called "guncotton" (ie cotton reinforced)
- In 1874 John Wesley Hyatt and in the 1877 Daniel Spill patented the cellulose nitrate.
- The cellulose nitrate was produced by Kodak in 1889 untile 1939 for phtotography and until 1951 for cinema.




1925
1 120

Cellulose acetate

- In 1905 the British chemist George Miles patented a preparation of diacetate hydrolysis of cellulose particles triacetate.
- In 1908 Kodak produces the first film safety film using cellulose acetate instead of the nitrate.
- In 1909, he invented a film called "safety" or security (in cellulose diacetate). But the film industry will take a long time before using it, because it is more expensive, and then films continue to be shot and projected by using a cellulose nitrate film.
- 1923 with Kodak.
- In 1932 the first 8 mm amateur motion-picture films, cameras, and projectors were Introduced. Tennessee Eastman began production of its first plastic Eastman Tenite Acetate.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STUDIO FOTOGRAFICO
A. VILLANI & FIGLI S.r.l.
BOLOGNA
Scatola N.
Lastra N.
CLIENTE
OGGETTO
OSSERVAZIONI
STAMPE N.

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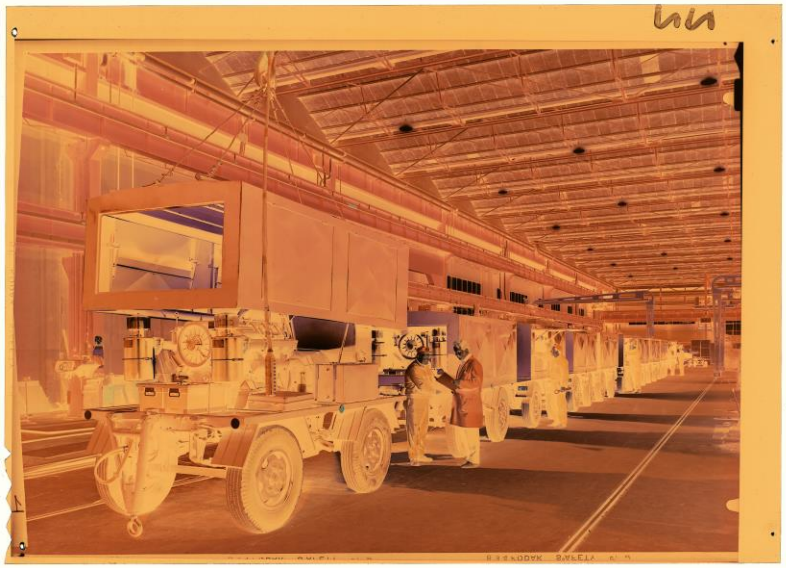
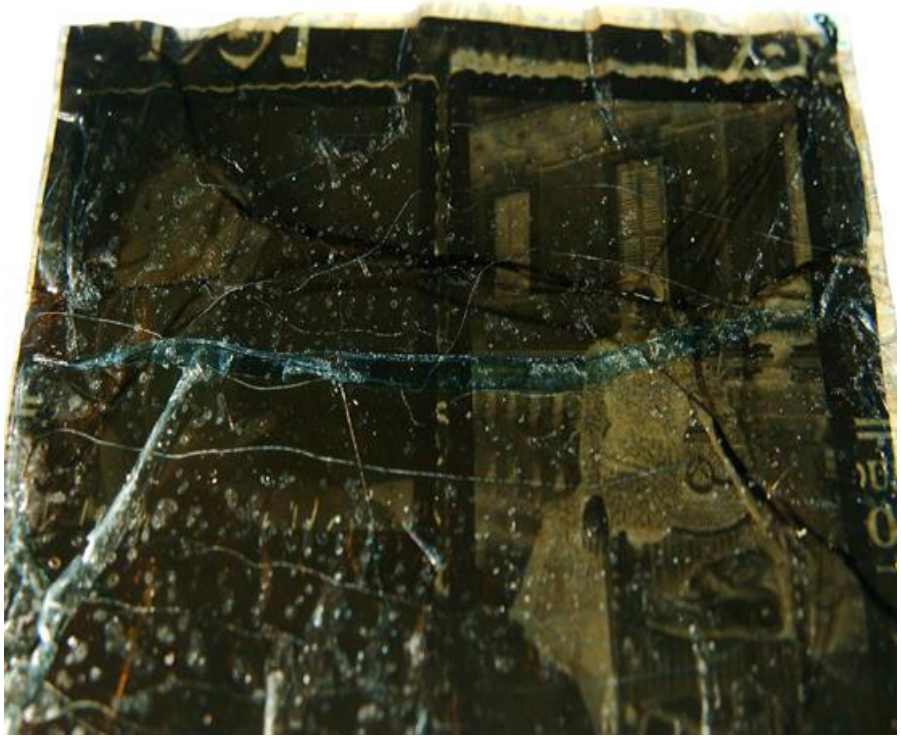
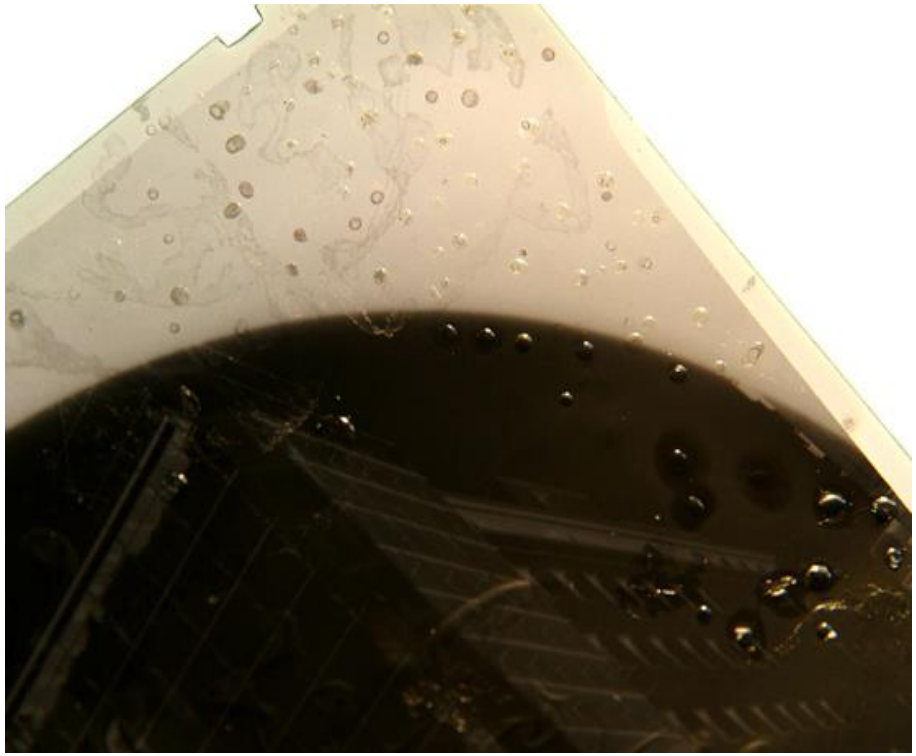
FERRANIACOLOR NEG.



- The structure of acetate film includes a support made of a sheet of transparent plastic (cellulose acetate), a gelatin emulsion coating, and an image of color dyes or metallic silver. The acetate base is susceptible to a form of chemical decay described as "**vinegar syndrome**" because of the characteristic vinegar odor of acetic acid which is produced by decomposing acetate. The degradation of cellulose acetate film base may also cause distortion, shrinkage, and brittleness. These chemical reactions are influenced by the storage environment (heat and moisture) and/or the presence of acidic vapors from film degrading nearby. Acid is initially generated within the cellulose acetate support layer, and from there it diffuses into the gelatin emulsion and often into the air, creating a sharp, acidic odor.

Degradation of the films in acetate





Degradation of the film negative in acetate

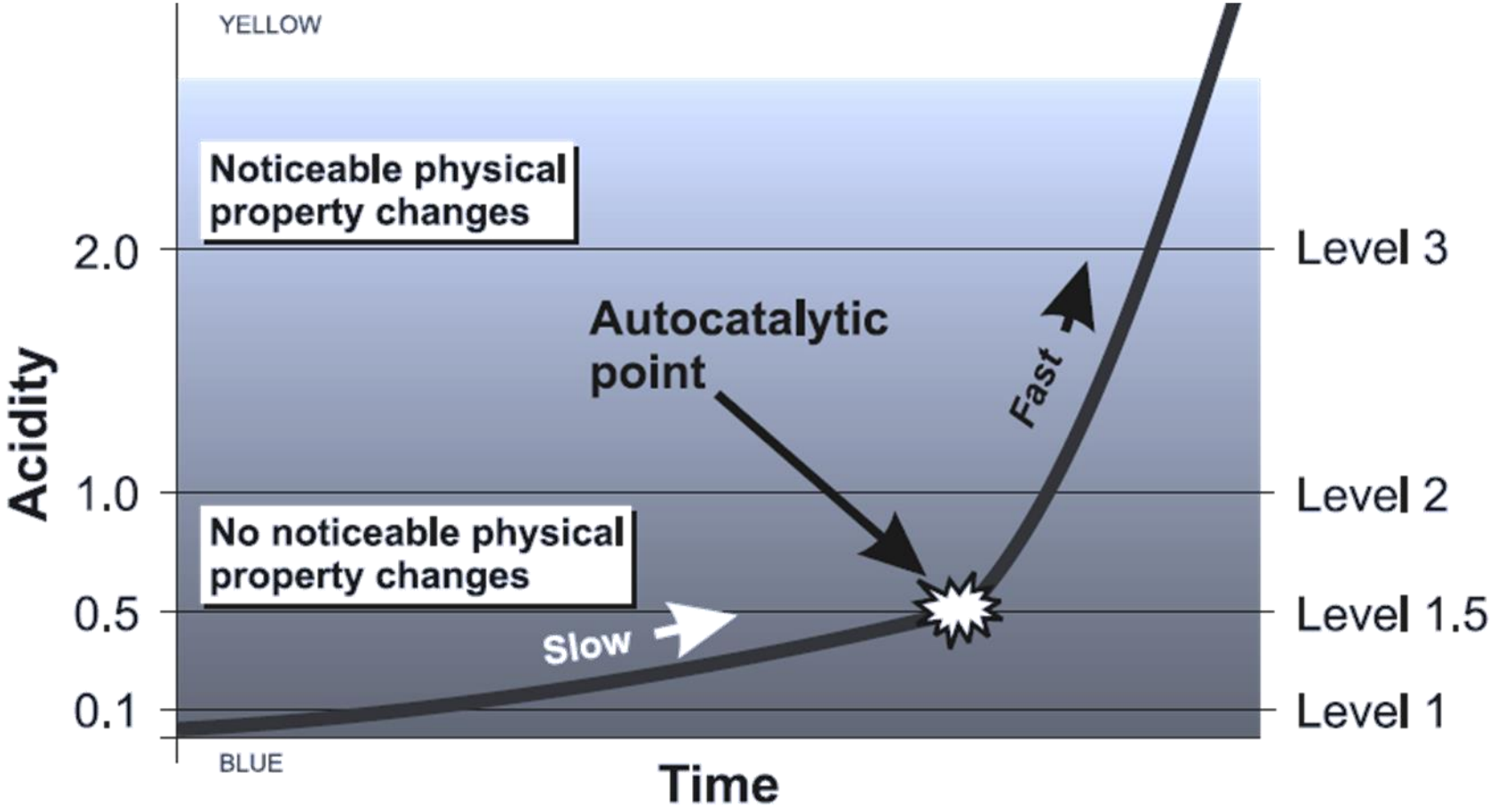


Table VIII: Approximate times to achieve an acidity of 1 for fresh film and for already degrading film depending on environmental conditions. Data from the IPI Storage Guide for Acetate Film.[17]

Environment	Time for a fresh film to reach acidity of 1	Time for an already decaying film to go from acidity of 0.5 to acidity of 1
21°C, 80% RH	20 years	3 years
21°C, 50% RH	**45 years**	5 years
21°C, 20% RH	100 years	20 years
4°C, 80% RH	165 years	15 years
4°C, 50% RH	400 years	**50 years**
4°C, 20% RH	1030 years	230 years

- The survey is conducted by inserting inside the boxes and bins, special maps detector, with the intention of verifying respectively:
  - The presence of the vinegar syndrome
  - The level of acidity of the supports and materials storage

Detection level of acidity

Dancan Cinema Services S.L

DANCHEK 2-Hour Acidity Tester

Danchek Color Shift	Smell	IPI Reading	Condition
pH 6,0	No Smell	Level 0	Fresh film
pH 5,5	No Smell	Level 0	Degradation beginning
pH 5,0	No Smell	Level 0	Degradation is increasing
pH 4,8	Weak Smell	Level 1	Degradation is more increasing
pH 4,6	Weak Smell	Level 2	**Autocatalytic Point** From now film should be watched
pH 4,4	Stronger Smell	Level 3	The film should be duplicated
< pH 4,0	Strong Smell	Level 3	The film has a very high priority for duplication

Degradation reference values

PH	Level	Conservation condition	Environmental recommendations
6	0	**Good** – fresh film	Cold (between 20° and 4°C)
5.5	0.5	**Discreet** – Degradation beginning	Cold room (between +4° and 0 °C)
5	1	**Poor** – Degradation in increasing	Cold room (between +4° and 0 °C)
4.8	2	**Critical –** Degratation in more increasing**.** Authocatalytic Point	Cold room or freezer (between +4° and – 21° C)
4.6	3	**Advanced**- Degradation in increasing also fisical	Freezer The film should be duplicated
4,4 - 4	3	**Advanced** – Deformation. Risk of manipulation	Freeze immediately Duplicate
	These recommendations have been provided by the Image Permanent Institute and are based on the parameters of the ISO standards for storage media in film *www.imagepermanenceinstitute.org*		

Each container should be sealed in a polyethylene bag for two days, in order to allow the map to identify, with precision, the actual level of degradation.

Extraction of materials from old envelopes

Identification

Notch code

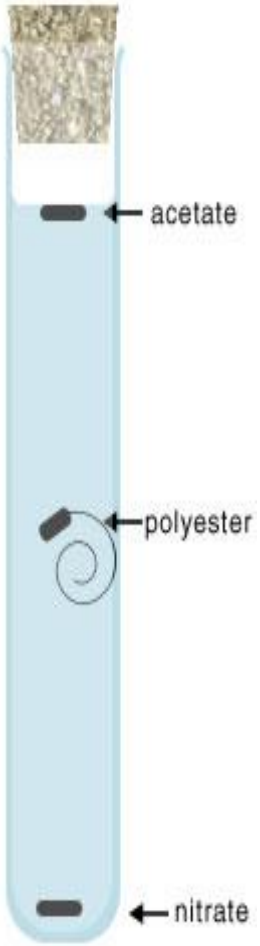
- We are identified the support of the film negative with a not distructive techniques, the Notch codes →→ small notches cut along one edge of the film border by manufacturer to help photographers identify the film type in a darkroom.
- The notch codes are based on those used for Kodak film before 1949.

Not distructive test

- **Polarization test**: with two polarizing filters or two pairs of sunglasses with polarizing lenses and a strong light source.
- In this case it need place the film between the two filters or polarized sunglass lenses and cross the filters so that light barely passes through them. Holding the lenses and the film to the light, if dimmed light and no colors the fil type is cellulose nitrate or cellulose acetate, if shimmering and rainbow-like patterns, the film is polyester.

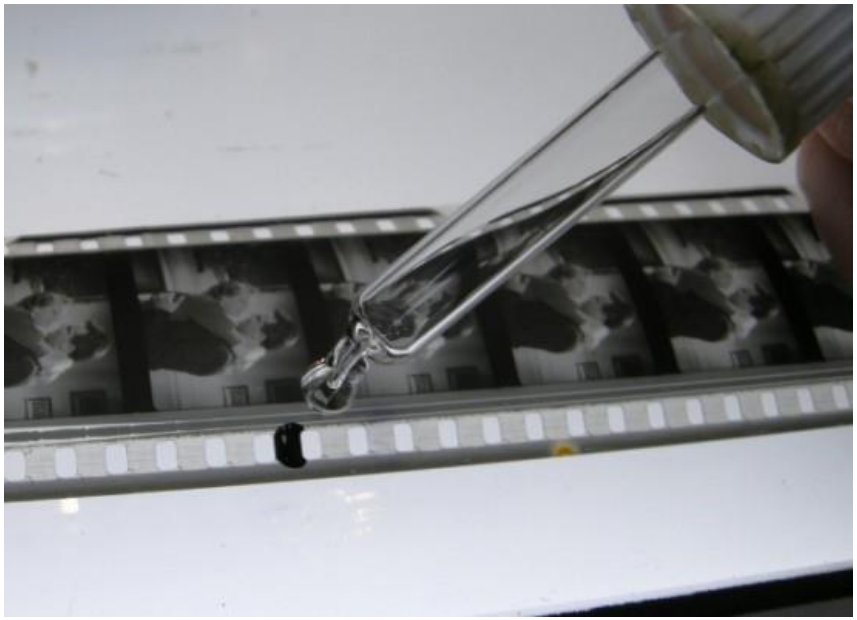
Destructive test

- The **float test** with a tube with trichloroethylene and a 6 mm square of film cut from a film border: if the film floats to the top, the film type is cellulose acetate film, if the film hovers in the middle is polyster film, if the film sinks to the bottom is cellulose nitrate film.
- But this test may be difficult to interpret because deteriorated acetate film may sink to the bottom like nitrate film.



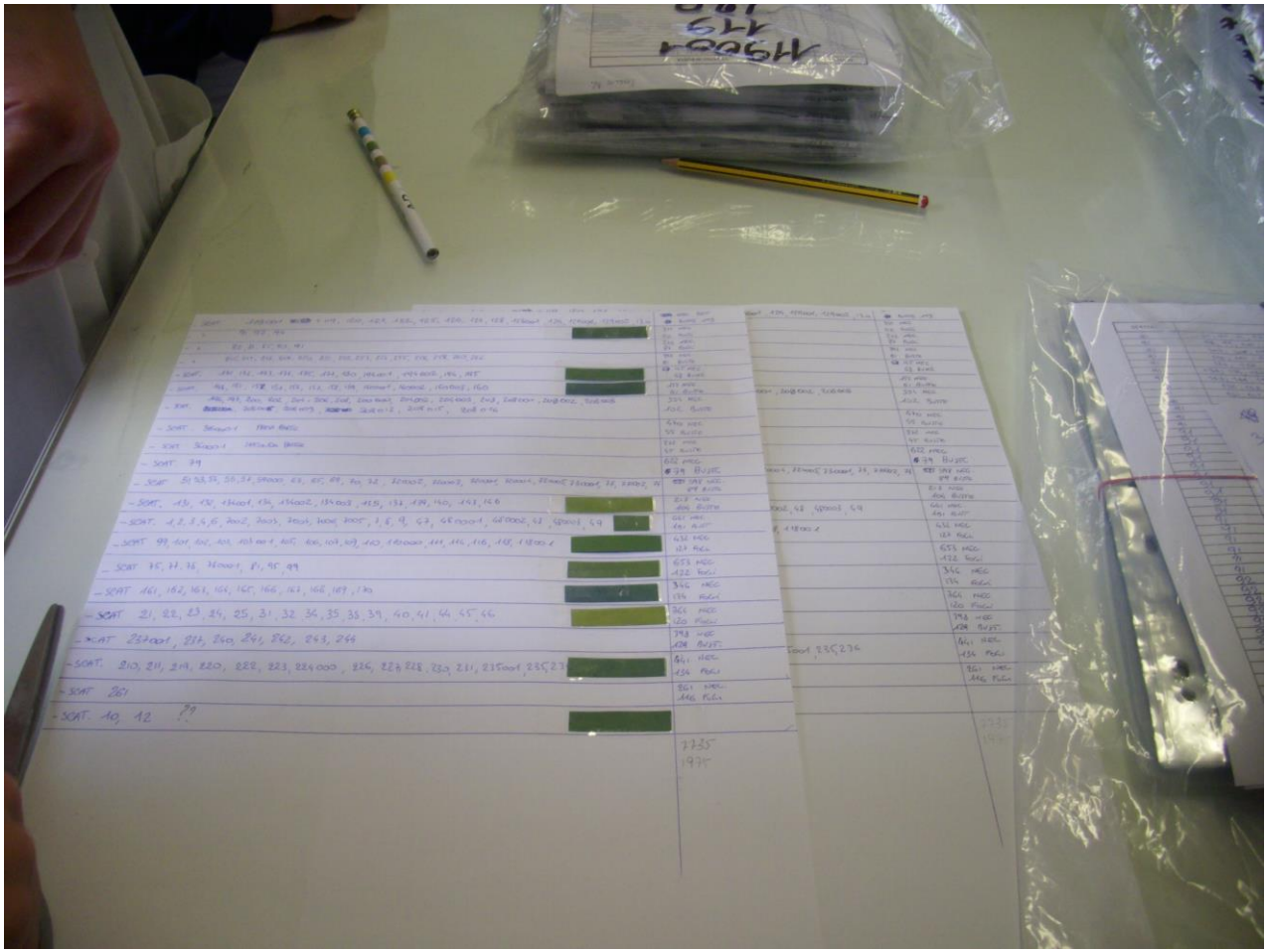
Destructive test

- **Diphenylamine test**: with a solution of sulfuric acid and diphenylamine. Palcing the film sample on the microscope slide and appling a drop of the solution, if the film turns a deep blue, the film type is cellulose nitrate, if the film remains clear or has a tinge of blu, is cellulose acetate or polyester.



Combustion test

- Similarly to the diphenylamine test, combustion test enables us to recognize nitrocellulose. Having cut off a snippet of stock, we can try setting it aflame. If the film burns dynamically, it means that we are dealing with nitrocellulose.



For decay of nitrate we have 6 levels

- 1 no decay
- 2 slight yellowing, emerge mirror silver
- 3 the film becomes brittle and tends to stick d containers; we perceive a strong smell of nitric acid
- 4 the film changes color becomes amber, it is increasingly fragile, bubbles appear and the image begins to fade
- 5 support it softens and adheres to envelopes, the smell is pungent, the image becomes unreadable
- 6 the film disintegrates into dust brown

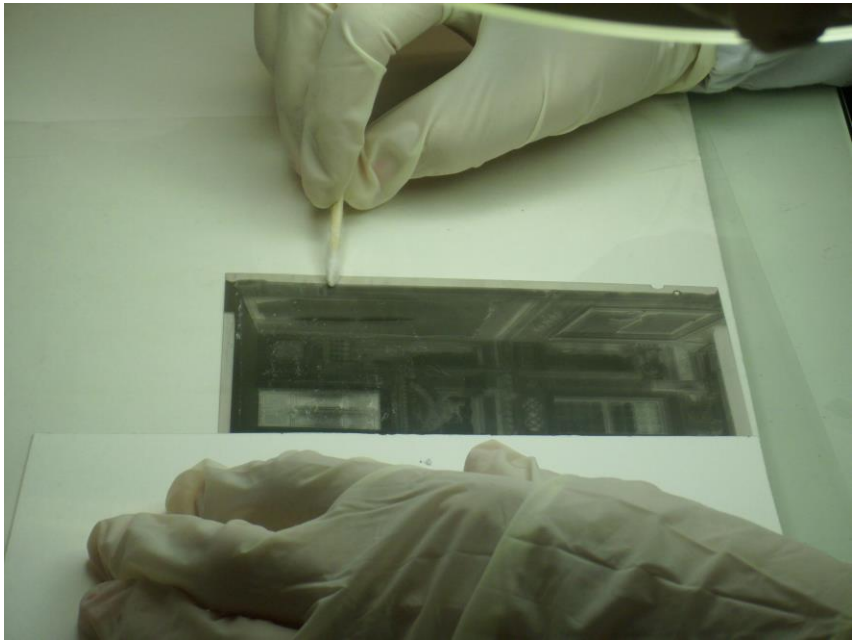
For decay of acetate we have 6 levels, but the main problem in VS

- The VS Vinegar Syndrome is autocatalytic and is triggered by a high percentage of relative humidity. The long chains of cellulose acetyl groups lose changing the structure of the polymer, all of this creates a brittle and contract support.

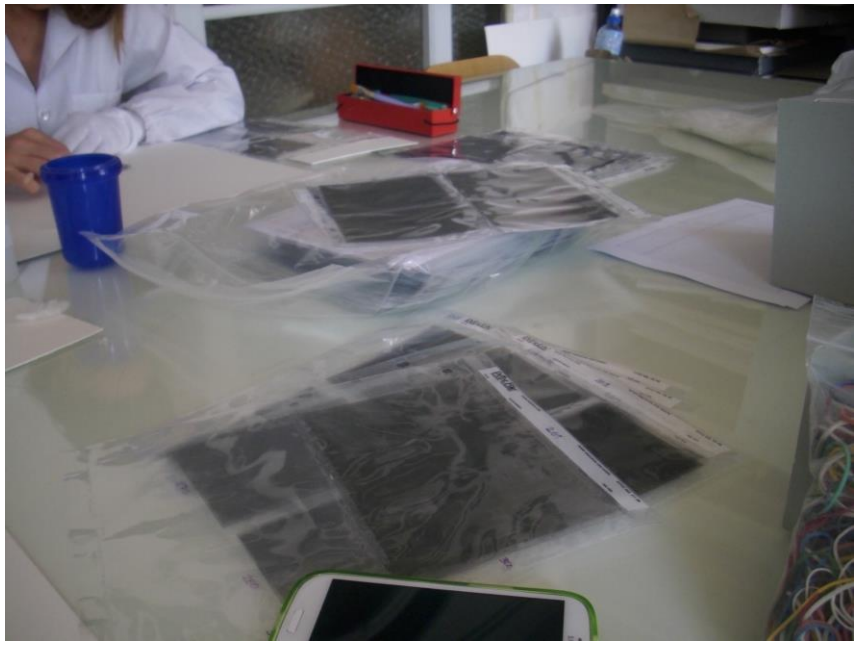
The 6 level of decay acetate:

1. no decay
2. slight smell of vinegar, the film starts to become brittle and shrink
3. the film tends to curl, forming stains blue or pink
4. the film deforms
5. bubbles appear and crystalline deposits, the picture may become unreadable
6. gap between gelatin and support

Cleaning of the negative and eventual restoration of the negative if presented glues and adhesives that have been removed



Inclusion of negative in conservation envelopes



Film negatives ready to freeze

Cooling cell

INDICATOR T -18 ° C

Refrigeration: benefits

- Storage temperature below zero (- 18 ° C is the highest safety index of conservation. Maximum chemical stability without causing irreversible damage to the physical properties
  The reduction in the level of humidity in the environment gives an effective control of climate
  - appropriate packaging
  - sealed container

Cold storage method CMI

Mark H.McCormick Goodhart

Senior Research Photographic Scientist

Smithsoniam Institution

http://www.wilhelm-research.com/subzero/CMI_Paper_2003_07_31.pdf

Assembly of the kit for the refrigeration

- The condition to conservation in Cold storage: - 18° and RH 30-40%. To achieve with these conditions we need to build a refrigeration cold room and follow the instructions to insert and constant maintenance of photographic materials.

Monitoring

- It is very important to constantly monitor the relative humidity inside the refrigerator with suitable equipment.

(INDICATOR 6 SPOT LEVEL OF RU)

THANK YOU!!!

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