



LET'S TALK BLOOMING

Conserving TPU-coated fashion and design objects

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BLOOMING IN TPU-COATED FABRICS

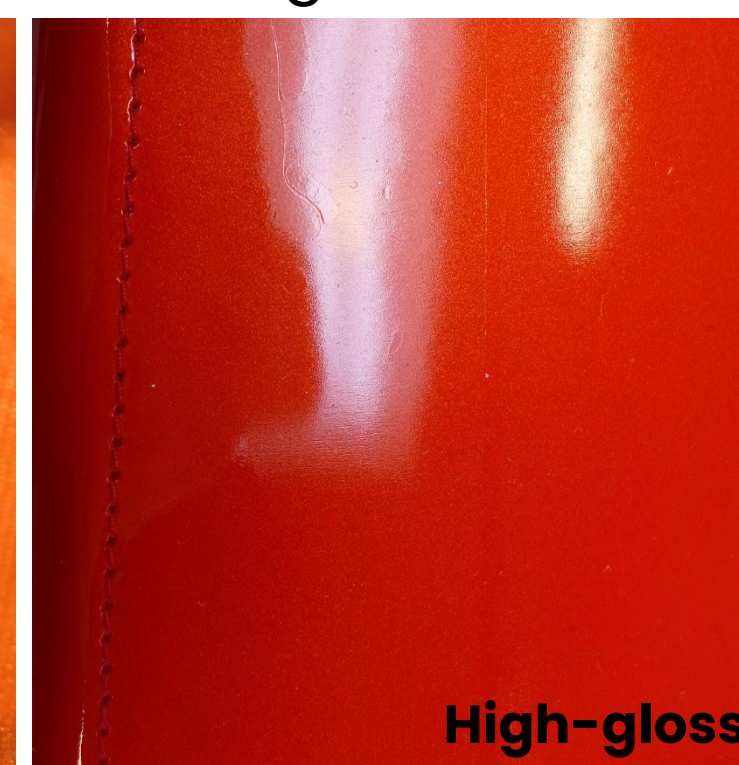
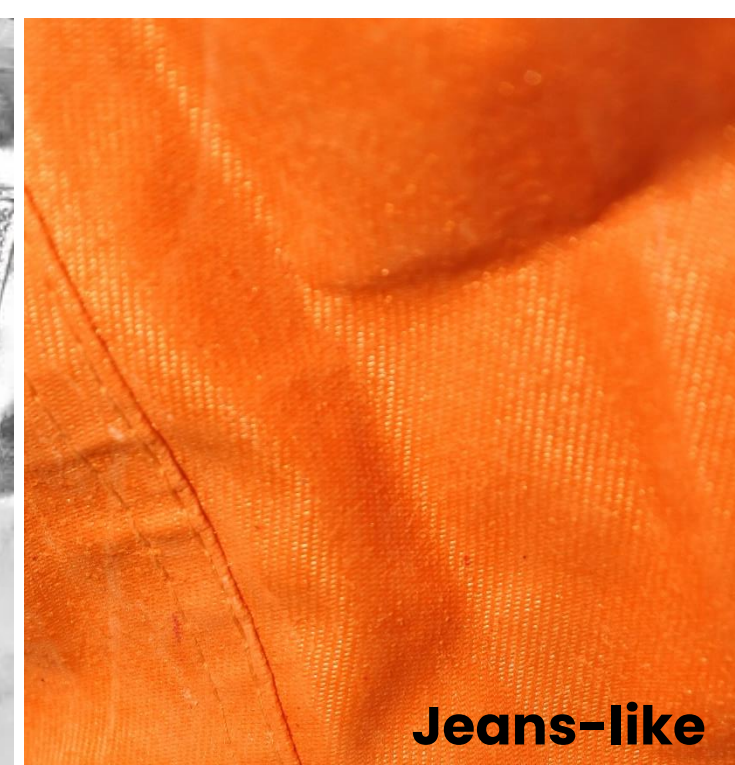
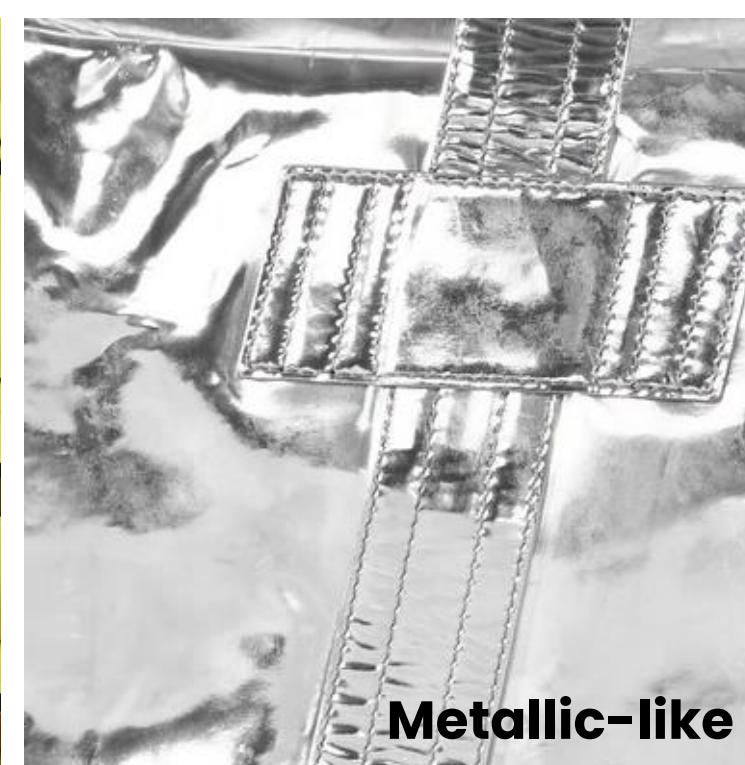
Thermoplastic polyurethane (TPU)-coated fabrics have been widely used in fashion and design since the mid-20th century, enabling innovative garments and design objects now preserved in museum collections worldwide.

However, TPU is inherently unstable and is considered one of the most challenging synthetic polymers to preserve. In polyester-based TPU coatings, degradation often appears as white crystalline surface deposits known as blooming.

The InBloom project investigated more than 30 heritage objects affected by blooming, highlighting the complexity of this ageing phenomenon. Blooming can appear as powdery, grainy, waxy or hazy deposits, but visual recognition alone is not sufficient to support conservation decision-making.



Examples of surface finishes of TPU-coated fabrics that can be found in heritage collections



With ageing, a surface originally intended to be homogeneous and glossy may become cloudy and dull due to blooming, raising wider cultural questions about authenticity, material identify and interpretation

AT WHAT POINT DOES MATERIAL CHANGE BECOME SO EXTENSIVE THAT IT ALTERS THE MEANING OR IDENTITY OF THE OBJECT?

THIS CHALLENGE FOSTERED A DIALOGUE BETWEEN HERITAGE PROFESSIONALS AND THE FASHION AND DESIGN COMMUNITY

RESEARCH METHODOLOGY

- 9 semi-structured interviews with key stakeholders
- 52 responses to an anonymous international online survey across 15 countries in Europe and the Americas

Together, these methods explored how blooming is recognised and managed in collections and how this knowledge supports conservation decision-making.

CONSERVATORS

CURATORS

DESIGNERS / FASHION BRANDS

COATED FABRIC MANUFACTURERS

Surface before (left) and after (right) blooming

WHAT DID THEY SAY? STAKEHOLDER PERSPECTIVES

CONSERVATORS

HIGH RECOGNITION. LIMITED EVIDENCE FOR ACTION

Blooming is widely recognised. About 94% of respondents had observed blooming in heritage collections, confirming it as a recurrent international conservation challenge.

High visual recognition of blooming

Although terms such as efflorescence, white residues, stains, crystals, powdery deposits, surface haze, white discolouration and chalking were also used

Limited chemical knowledge of affected materials and whitish deposits

Only 10 out of 52 respondents mentioned the use of analytical techniques

- High uncertainty regarding appropriate storage materials and environmental conditions
- Less than 50% attempted cleaning, and most treatments were based on trial and error
- More than half reported no treatment due to insufficient evidence to support intervention

DESIGNERS & FASHION BRANDS

NO SINGLE VIEW ON MATERIAL CHANGE

Surface qualities shape design identity. Gloss, texture, flexibility and colour are central.

Long-term material behaviour is rarely considered in design decisions. Aesthetic and functional qualities usually drive material choice.

Ageing can carry different meanings. It may become part of an object's biography – or conflict with the intended appearance.

CURATORS

DISPLAY IS A NEGOTIATION

Condition alone does not determine display. Stability, significance and narrative also matter.

Degradation does not automatically prevent display. Exhibition strategies can adapt if the object remains safe and meaningful.

Early dialogue is essential. Curators and conservators should assess condition before exhibition choices are fixed.

MANUFACTURERS

NO SINGLE CAUSE. NO SIMPLE FIX

Blooming depends on the whole material system. Polymer chemistry, additives, substrate and processing all matter. **Terminology differs.** Industry may use terms such as whitening, haze or migration rather than “blooming”. **Prevent rather than treat.** Problematic formulations are modified or discontinued.

WHAT DO WE RECOMMEND?

NO SINGLE ANSWER. DECIDE CASE BY CASE

1 – UNDERSTAND THE CHANGE

Identify the material, characterise the blooming and assess the overall condition

2 – ASK WHAT THE CHANGE MEANS

Does it compromise design identity, significance, stability or interpretation?

3 – BRING PERSPECTIVES TOGETHER

Combine conservation evidence with design intent, curatorial goals and industrial knowledge

4 – DEFINE THE CONSERVATION RESPONSE

MONITOR · TREAT · ACCEPT · INTERPRET

CONSERVATION BECOMES A SHARED PRACTICE, NOT A STANDARDISED RESPONSE

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