P35
A. Winkler

# BIOBASED ARTIFICIAL LEATHER

FILK Freiberg Institute

## Introduction

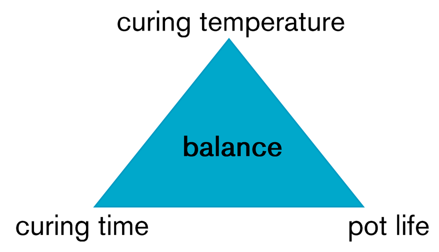
for more information:

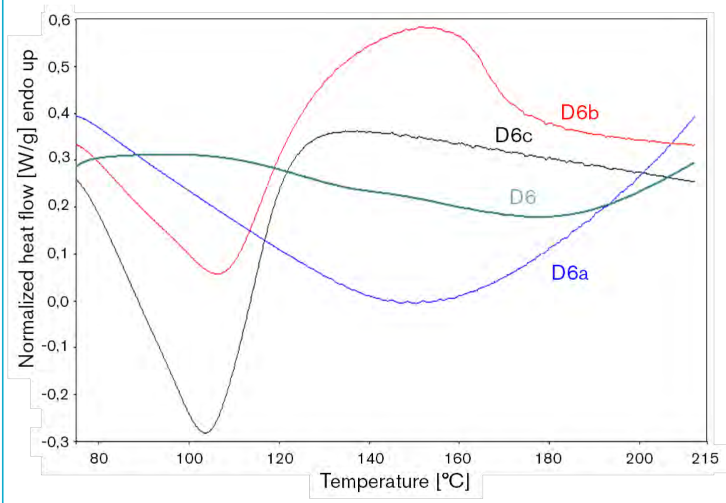
SCAN ME!

The finite nature of fossil resources, their costly and environmentally harmful extraction as well as the release of $CO_2$ when they are used are just some of the reasons for the necessary switch to bio-based and renewable resources. Industrial formulations for artificial leather are mostly based on fossil resources. Therefore there is a need to develop bio-based alternatives. By using bio-based basic components of polyurethane chemistry (polyols, isocyanates) the three individual layers of artificial leathers – topcoat, foam coat, adhesive coat – were developed with formulations containing 100 % 2K-PU systems.

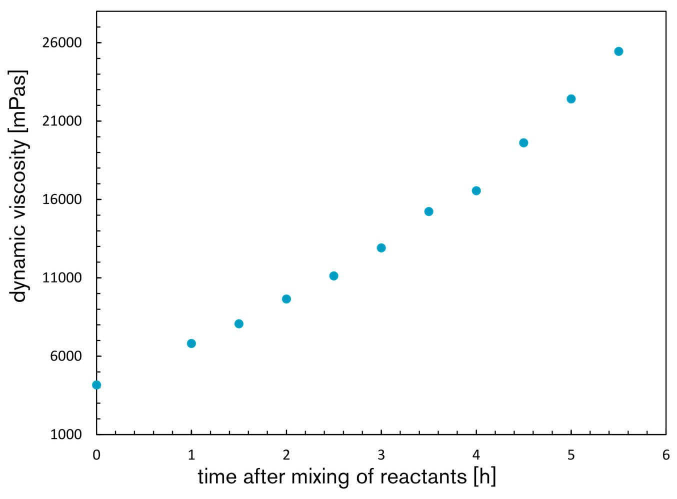
## Basic formulation

- analysis of reactivity of organotin-free catalysts in bio-based polyol-isocyanate reaction mixtures



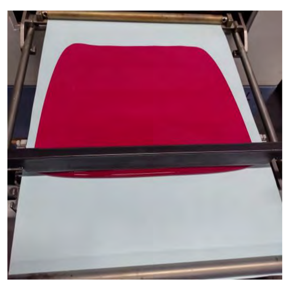

DSC measurements of bio-based polyol-isocyanate mixtures with organotin-free catalysts




Rheological measurements of basic formulation after different times (investigation of pot life)

## Topcoat

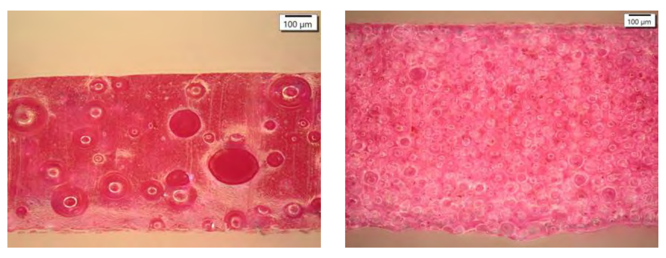
- addition of rheological additives, defoamer, pigments, fillers
- investigations to layer formation
- test of different transfer papers



Topcoat application

## Foam coat

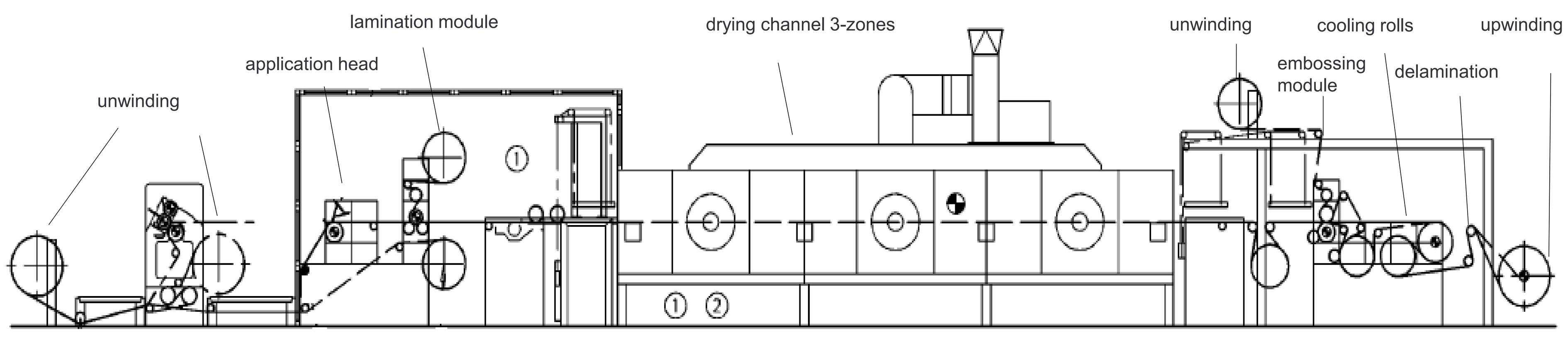
| two different methods | |
|---|---|
| mechanical | physical |
| mixing with air | adding of microspheres |

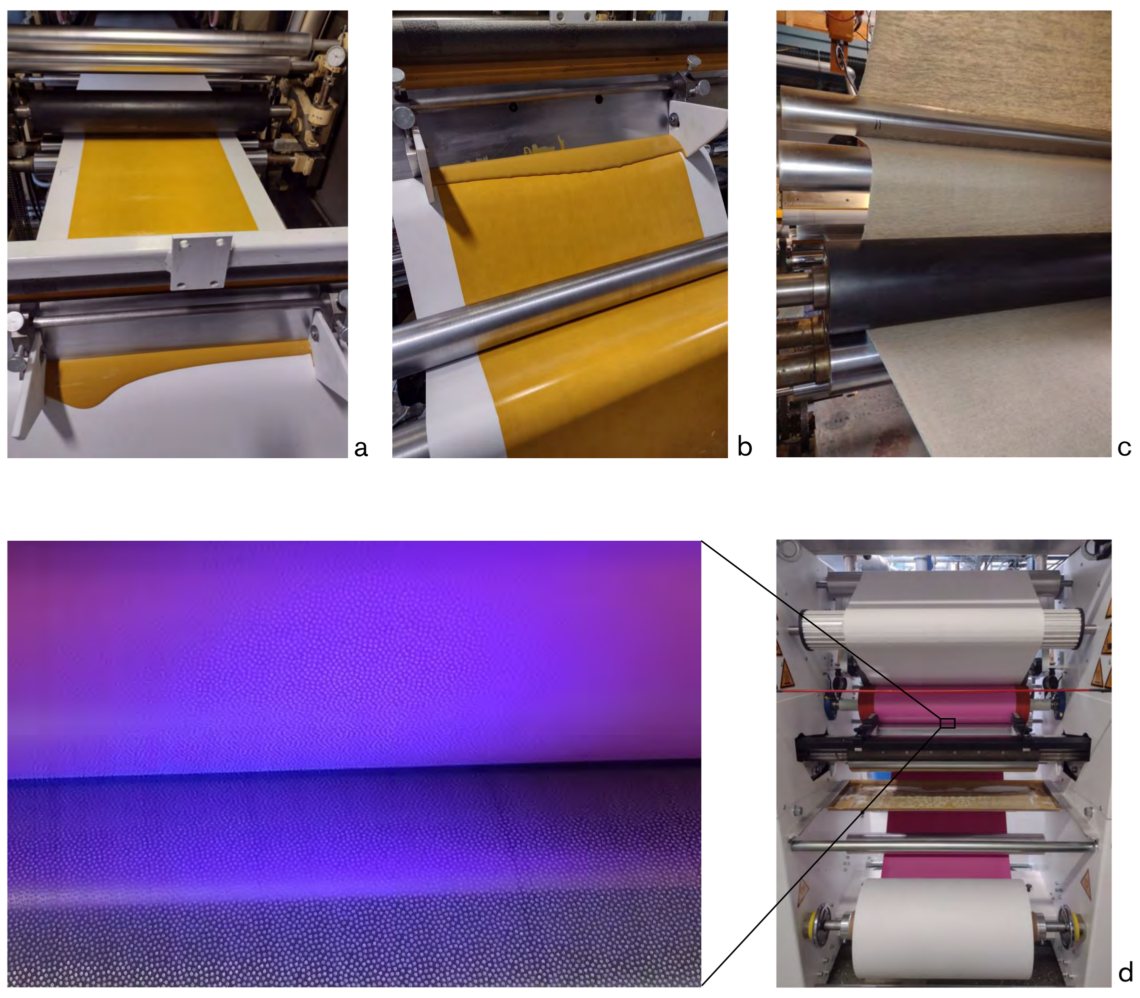


Microscopic pictures of different foams

## Upscaling

- manufacturing of artificial leather at a pilot plant in a continuous roll-to-roll process



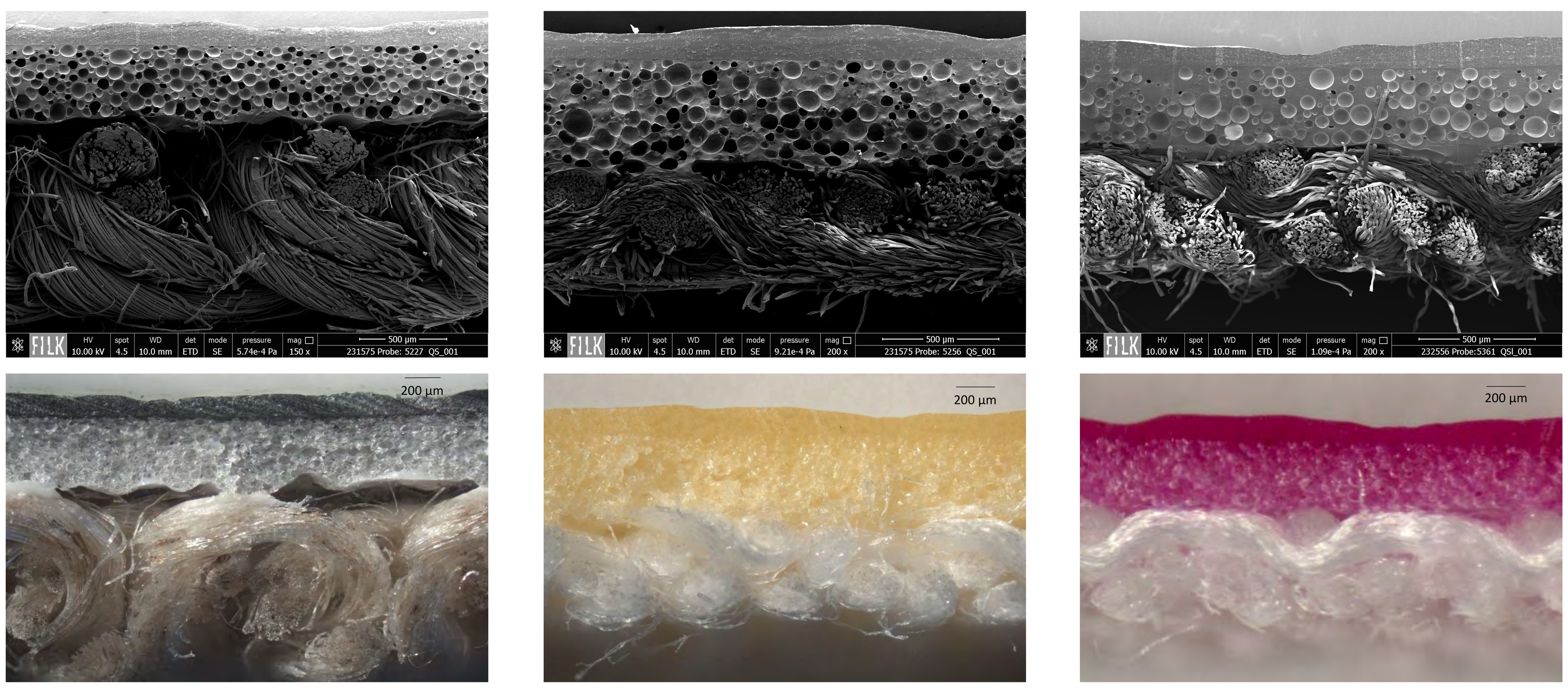
a application of topcoat on embossed transfer paper

b application of foam coat on cured topcoat

c lamination of hemp textile with adhesive coat

d lamination of cotton textile with bio-based reactive PU hotmelt application of hotmelt with a gravure roll



Samples (top), REM (middle) and microscopic pictures (below) of bio-based artificial leather manufactured in technical scale

## Conclusion

### Formulation properties

- solvent-free, organotin-free
- organic/mineral content: 85 – 87 %

### Artificial leather properties

- organic/mineral content: 90 – 92 %
- light fastness: (DIN EN ISO 105-B02) 8
- abrasion resistance: (DIN EN ISO 5470-2) >100000
- color fastness to rubbing: (DIN EN ISO 105-X12) 5/5
- coating adhesion to hemp: 1,49 N
  coating adhesion to cotton: 3,58 N
  (DIN EN ISO 2411)
- low sensitivity to soiling media
- good chemical resistance

- to be optimized:

  folding and kinking behavior

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INNO-KOM

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