caLIBRAte nano risk governance

Data to support Risk Assessment along use-phase and end-of-life: the caLIBRAte case study on paints containing TiO_2 and filler materials

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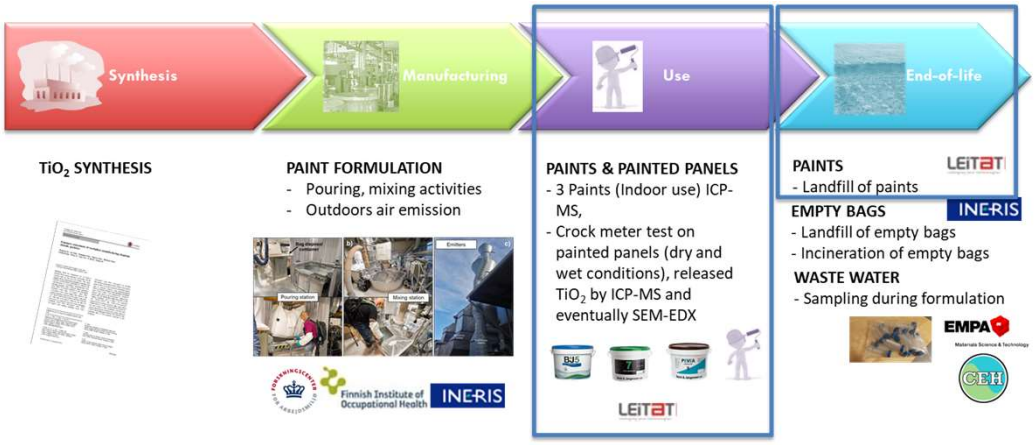
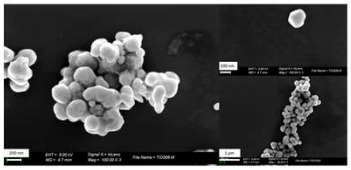
Data generated in different exposure scenarios, including paint formulation, use and end of life

For the demonstration of the caLIBRAte framework, a state-of-the-art suite of value-chain case-studies (CS) are provided as standard examples and inspiration for using the risk assessment (RA) models/tools selected.
The most comprehensive CS attempt to cover as many critical exposure scenarios (ES) along the life cycle stages as possible and focusses on a fully implemented industrial application of NMs: the use of TiO_2 NM as pigment in the paint industry (B&J Case Study).
To investigate possible release of NM during the use-phase and end-of-life scenarios, three different paints containing TiO_2 NM were used in experiment aimed to simulate use-phase and end-of-life situation/activities.

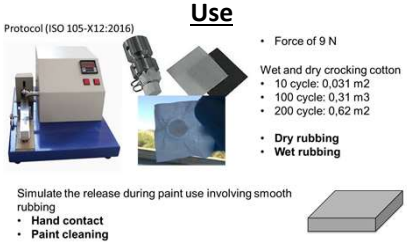


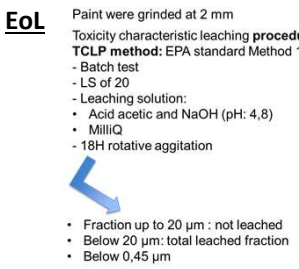
Nano-enable product description

- TiO2, size=173nm,
- BET=12.6 ± 1.3 m^2/g,
- 95% TiO2, coating of Al, Si and Zr,
- Dustiness TiO2= 73,1 ± 42,2 mg/Kg,
- Rutile.

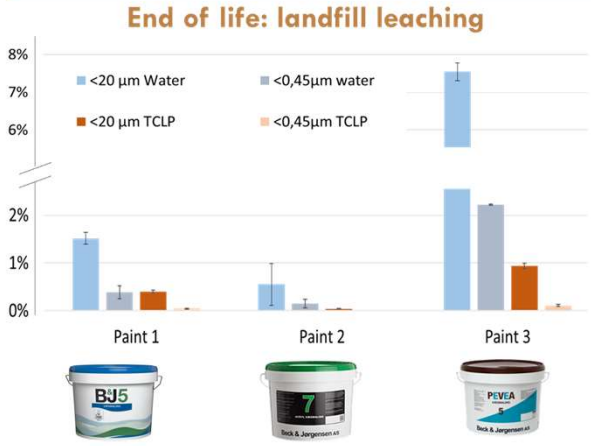


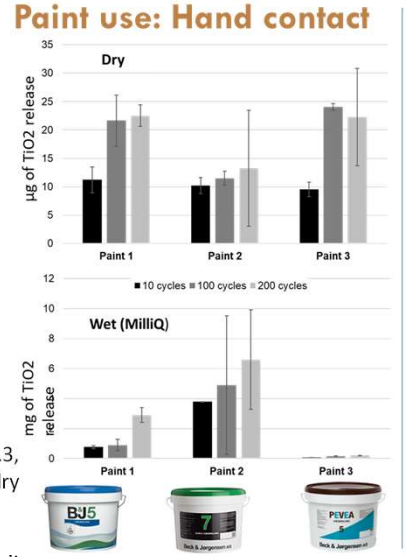
Methods: Use and end of life simulation





Results





- Use: release of paint thickness after 200 wet rubbing cycles is 2.3, 5.3 and 1.16 microns, for paint 1,2 and 3, respectively while dry rubbing between 8 and 19 nm,
- High variability of leaching depending of the paint matrix
- Paint solubility increase the release during leaching but reduce it during wet rubbing

Conclusion

- The use of normalized protocol allows generating comparable data with other NEP,
- Collaboration with industrials allows to investigating realistic manufacturing condition and relevant commercialized NEP,
- Lab-scale experiments provided data on the potential release of TiO_2 NM from paints in real-life exposure scenarios that can be used for model demonstration purposes.
- The incorporation of the data in exposure models is the next step to assess the exposure all along the NMs life cycle and define the critical LC stage, compartment involved

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