

Prospective Assessment of Nanotechnology: Case Study on Nanosilver in Textiles

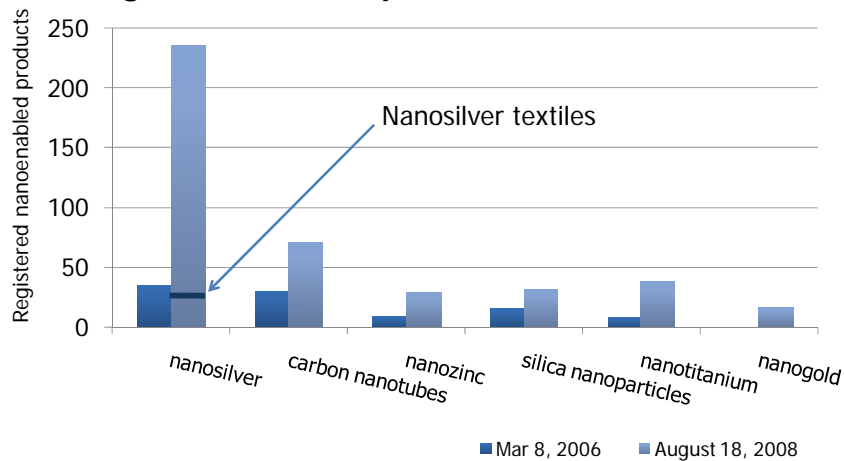
Tobias Walser¹, Evangelia Demou¹, Daniel J. Lang², Stefanie Hellweg¹

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¹Institute for Environmental Systems Design, ETH Zurich ²Institute for Environmental Decisions, ETH Zurich

Increasing nano-enabled products



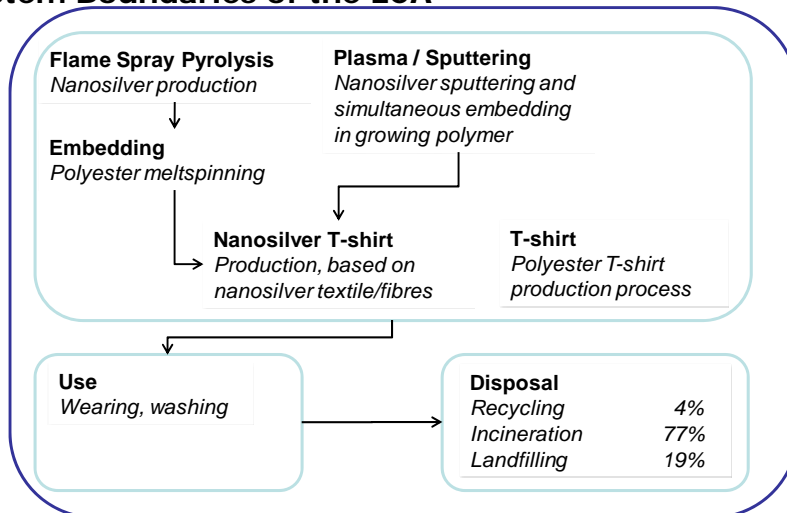
- nanosilver: 60m²/g, bacteriotoxic

Woodrow Wilson
Institute (2009)

Goal of the Study

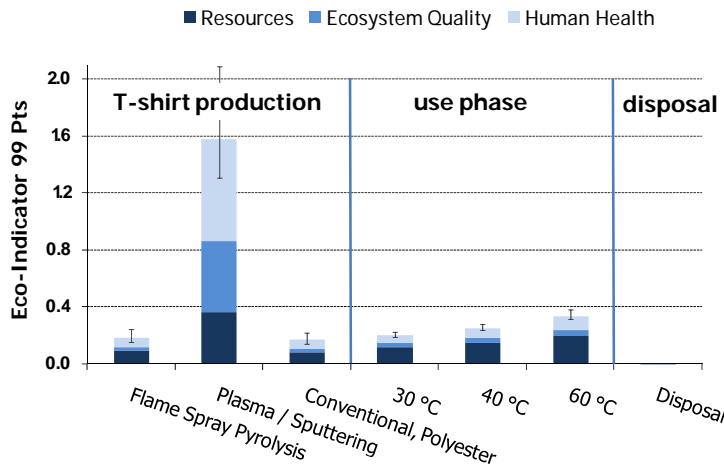
- **Cradle-to-grave environmental assessment** of nanosilver textile applications
- **Comparison of two nanosilver production technologies**, considering different development stages
- **Formative Scenario Analysis** (*Wiek et al. 2008*) for a prospective view, including future developments in society and nanotechnology industry: case Switzerland 2020

System Boundaries of the LCA



- inclusive raw material acquisition, energy and precursor production, and emissions

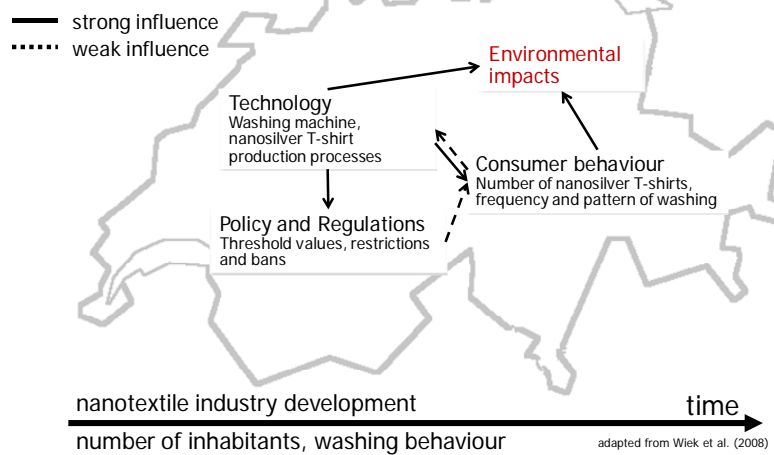
Life cycle assessment of nanosilver T-shirts



- Use phase: 15 T-shirts/cycle, 100 washings/T-shirt
- Uncertainty bars: 95%-CI; Electricity mix: UCTE
- No nanospecific environmental impacts included

Formative Scenario Analysis

- Possible future states of the analyzed system
- Groups of determining variables



Scenarios: Environmental impacts (Switzerland, 2020)

Estimated development

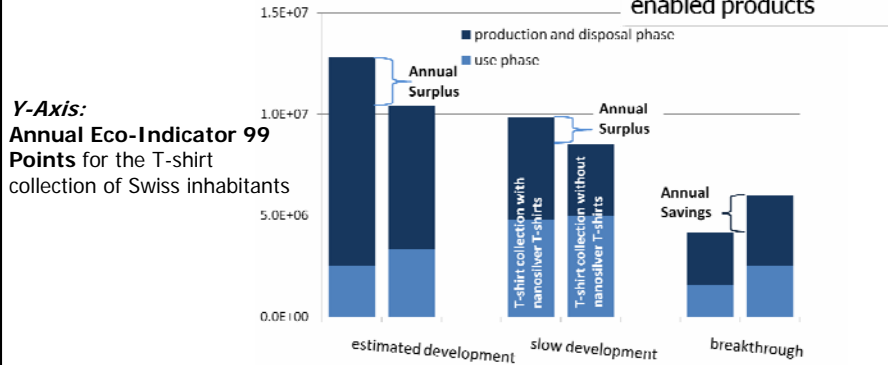
- foreseen technological development
- hesitating consumers

Slow development

- slow development of nanotechnology
- strict regulations
- sceptic consumers

Breakthrough

- enhanced efficiency of nanoparticle processes
- supportive regulations
- consumers use the full potential of nano-enabled products



Summary/Conclusion

- Different nanosilver coating production technologies have significantly different environmental impacts
- The use phase of (nanosilver) T-shirts is sensitive to washing behaviour
- Nanosilver textiles may contribute to environmental benefits **IF** washing frequency is lowered
- Nanosilver emissions are not considered by current impact assessment methods

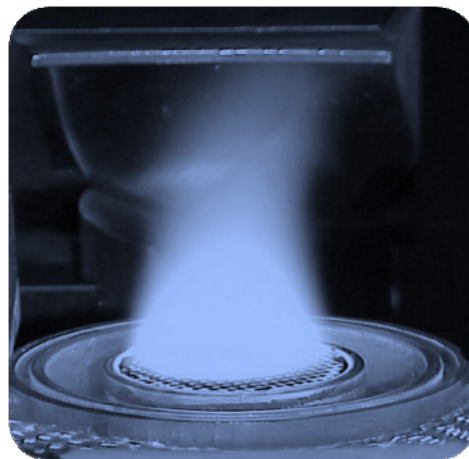
Outlook

- Consideration of nanoparticle-related effects in LCA
- Measurement of release rates and effectiveness of nanosilver applications
- Performance based indicators for nanoenabled products – what are net environmental benefits or impacts?

Questions?

Email
tobias.walser@ifu.baug.ethz.ch

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Height, Murray (HeiQ)
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Luechinger, Norman (Nanograde LLC)



Pratsinis (2009)

Thank you for your attention!

Key sources

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