

Toxins in material stocks and flows: An integrative modelling approach

Supervisor: Rolf Widmer, contact: rolf.widmer@empa.ch

Co-supervisors: tbd

Context

Toxins are abundant in anthropogenic material stocks and flows. They limit the (re)useability of materials by (a) decreasing their technical quality and/or (b) imparting toxicity to the materials. During manufacture, use and recycling of these materials, toxins may get added or lost through various processes.

Goals

The goals of this master thesis would be to:

- Develop a framework of how to model the fate of toxins and the respective material stocks through repeated recycling. This would include a literature review on recycling and developed concepts and extended discussions with “recycling experts” of various materials.
- Independently implement the framework as a mathematical model, e.g. in matlab.
- Empirically and analytically characterise the performance and properties of the model, for example with regards to steady-state concentrations, dilution / concentration effects, maximum amount of cycles allowed, ...
- Calculate the model for various realistic setups and draw conclusions from their comparison (e.g. Cu in Al alloys, PBDE flame retardants in plastic).