

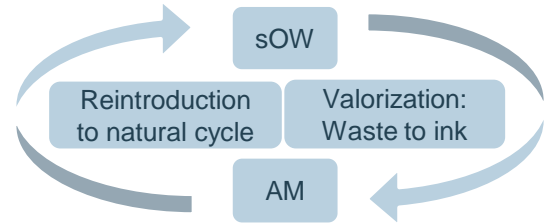
# Ink from Organic Waste for Additive Manufacturing in Space

**Martin Cerff, Ines Wagner, Nicolas Faber**

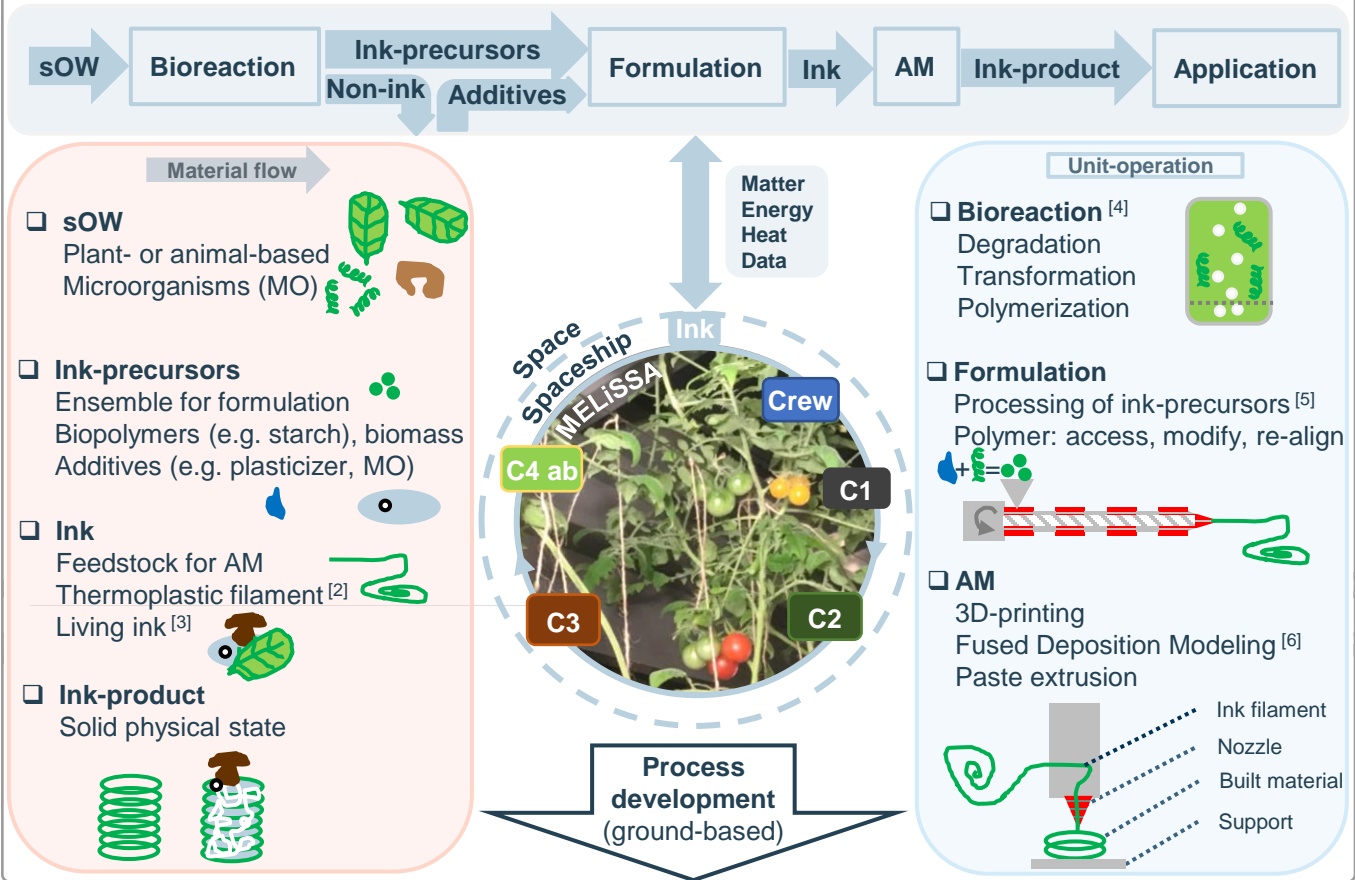
Contact: Blue Horizon S.a.r.l., 9, Rue Pierre Werner, 6832 Betzdorf, Luxembourg, martin.cerff@bluehorizon.space

## Motivation

- ❑ Solid organic waste (sOW): waste or opportunity?
- ❑ Towards a circular economy [1]
- ❑ Increase autarky and flexibility in space
- ❑ Additive manufacturing (AM)

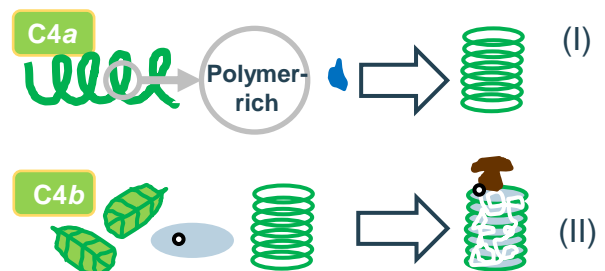


## Modular extension of the MELiSSA cycle: ink-generation process



## Challenges and way forward

- ❑ Focus on microbial biomass, e.g. *Spirulina* (I)
- ❑ Polymer enrichment of biomass, e.g. protein
- ❑ Extrusion of biomass with polyol
- ❑ Thermoplastic filament ink for AM
- ❑ 3D-printing of ink, e.g. tool or mold
- ❑ Complementary fungal living ink (II)
- ❑ Grown mycelial structure



## References

- [1] Maina 2017: dx.doi.org/10.1016/j.cogsc.2017.07.007  
 [2] Mathiot 2019 doi.org/10.1016/j.carbpol.2018.12.057  
 [3] Wösten 2018: ESA RFP/NC/PLPTE/LF/as/518.2016  
 [4] Prater 2019: doi.org/10.1007/s00170-018-2827-7  
 [5] Poughon 2020; doi.org/10.1016/j.issr.2020.03.002  
 [6] Zhang 2014 Innovations in Food Packaging Bier 2013: DOI: 10.1002/mame.201300248

