Biobased composites materials from waxes and lignocellulosic powders for additive manufacturing

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Abstract {Max words limit 250}

Additive manufacturing (AM) is a way to rethink the design of new and functional objects by minimizing the quantity of material used compared to subtractive techniques. The AM application of biobased materials, or their composites sourced from biomass feedstocks, is key to reducing the impact of the human activities on the environment and contributing to a societal shift towards a circular bioeconomy. However, such materials are not easily implementable in current AM technologies due to technological limitations related to these materials' behaviours and morphologies. In the case of composite materials as feedstocks, the structure of the polymeric matrix and the interaction matrix and filler needs to be understood before adapting to the AM processes.

In this study, we explored the use of biobased composite materials from waxes and fine lignocellulosic powders by two AM technologies: Paste Printing (PP) and Selective Laser Sintering (SLS). The starting raw materials (beeswax, pine-wax and lignocellulosic powders from different feedstocks) were characterized to understand their influence in the different processes. Composite powders were developed using an emulsion process to produce particles suitable for SLS application. The rheological properties of the pastes and the flow properties of the composite powders with different formulations were studied to optimize the processability of the materials in both AM technologies. Objects with contents up to 60 wt.% of lignocellulosic powders were successfully printed and their functional properties were compared. Our preliminary results address different process behaviors from the raw materials based on their chemical composition and their physical behavior.

Biography: {Max words limit 100}

Dr Claire Mayer-Laigle is a research engineer from the French National Research Institute for Agriculture, Food and Environment (INRAe). During the last 8 years, she managed an INRAe facility for the plant materials processing in Montpellier (France). She has been a visiting researcher to SCION research institute in Rotorua (NZ) in the framework of an European grant : The SMARTPOP Project (H2020 - MFSA-IF , grant Number 893040) with the aim to develop new sustainable and functional materials from lignocellulosic powder using additive manufacturing technique.