HIPPIE
High Performance Polymers from Isoidide

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Background

There is a general need for biobased polymers with improved properties compared to the current commercial biobased polymers. In particular there is a need for biobased materials with improved thermal and mechanical properties, comparable with (or superior to) current petrochemical based engineering plastics, like polyethylene terephthalate (PET), polybutylene terephthalate (PBT) or polycarbonate (PC). Such materials are not only suitable for packaging applications, but also for more demanding applications like (consumer) electronics, automotive, building & construction, where properties high temperature performance, high strength, impact resistance, or optical transparency are required.

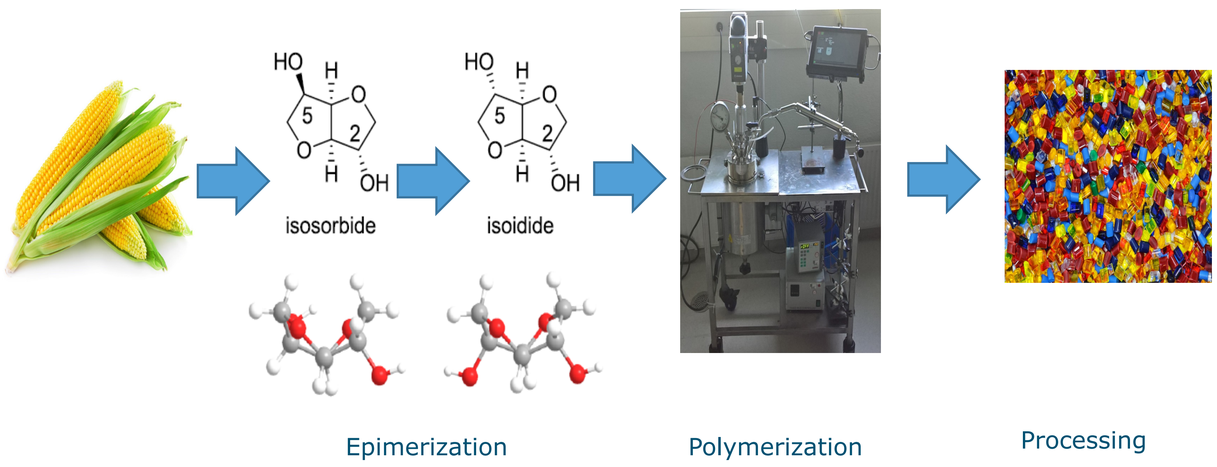

Figure 1. Schematic depiction of the steps in the BPM-Hippie project.

Objective

The objective of this project is to further develop high performance biobased polymers that can be used as engineering plastics in demanding applications like packaging, electronics, automotive, and construction materials. The project will build upon previously generated fundamental knowledge by Archer Daniels Midland (ADM) and FBR on the catalytic production of the rigid sugar derived diol isoidide and the effects of incorporating this monomer into high molecular weight biobased polyesters. In this project the emphasis will be on preparing (novel) biobased, isoidide containing polyesters on sufficiently large scale to allow for a broad range of property determinations.

Approach

ADM will focus on the optimization of the previously (by FBR) developed technology for the epimerization of isosorbide to isoidide.
FBR will focus on the synthesis of polyesters based on isoidide in combination with various (biobased) diacids.
Polyesters will be synthesized on scales ranging from 1 gram up to 1 kg.
Holland Colours will look to the necessary additives for processing.
DuPont will take care for upscaling.
ADM and DuPont will supply the dimethylester of furan dicarboxylic acid.

Project partners

- **Archer Daniels Midland Company (ADM)**
  Archer Daniels Midland Company is one of the largest agricultural processors in the world. Serving as a vital link between farmers and consumers, we take crops and process them to make food ingredients, animal feed ingredients, renewable fuels and naturally derived alternatives to industrial chemicals. Founded in 1902 and incorporated in 1923, ADM is headquartered in Chicago, Illinois, and operates processing and manufacturing facilities across the United States and worldwide. Through our extensive global distribution facilities and capabilities, ADM makes a significant contribution to the world's economy and quality of life.
- **DuPont**
  DuPont is a science company dedicated to solving challenging global problems, while creating measurable and meaningful value for its customers, employees and shareholders. Our dynamic portfolio of products, materials and services meets the ever-changing market needs of diverse industries in more than 90 countries. We unite around a set of core values—safety and health, environmental stewardship, highest ethical behavior and respect for people—just as we have for two centuries.
- **Holland Colours**
  Holland Colours develops, produces and commercializes liquid and solid colorants, masterbatches and additives for coloring rigid and flexible PVC for the building and construction industry, as well as PET and polyolefins for the packaging industry. Our technical experts are always creating new color solutions to give our customers peace of mind based on precise color match and color consistency.
  Holland Colours is a Dutch company listed on the Euronext Amsterdam Stock Exchange. With committed employee shareholders and operations in the Americas, Europe and Asia, we provide personal local service on a global scale.
- **Wageningen UR Food & Biobased Research**
  Food & Biobased Research has many years of experience in the conversion of natural resources into new bio-based building blocks which can be used for bio based materials and products. FBR is fully integrated in development chain from organic synthesis to polymer processing.

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