

Project title: Development of Amazonian bio-dyes from renewable resources for industrial dyeing of biopolymers - BioPolyCol

Partner: Bache GmbH, Rheinberg
 Universidade Federal do Rio Grande do Sul, Porto Alegre, Brasilien
 Instituto Nacional de Pesquisas na Amazônia - Coordenação Sociedade, Ambiente e Saúde, Manaus, Brasilien
 Beplast Indústria e Comercio de Plásticos Ltda, Sao Leopoldo, Brasilien

Duration: 01.09.2022 - 31.08.2025

Funding Agency: BMBF, Bioeconomy International 2021

Univ.-Prof.
Prof. h.c. (Moscow State Univ.)
Dr.-Ing. Dipl.-Wirt. Ing.
Thomas Gries
 Director

Dr.-Ing. Franz Pursche
 Head of Monofilament Technology

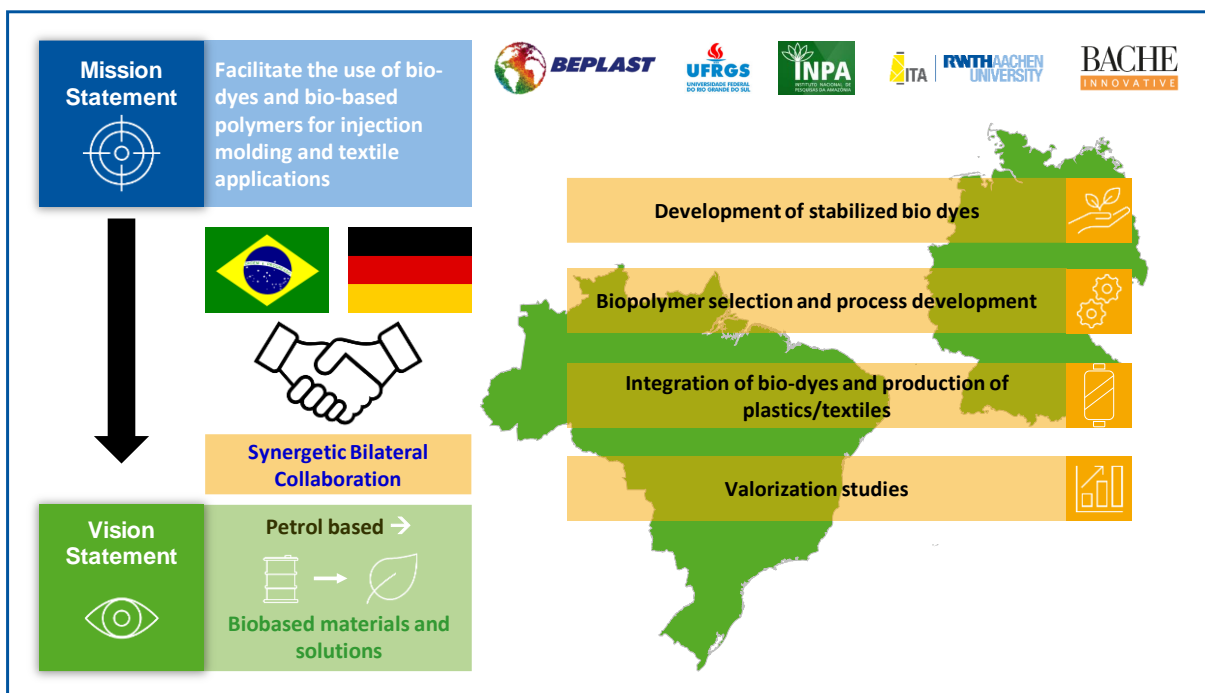
Leonie Beek, M.Eng.
 Researcher

Jannis Langer, M.Sc.
 Researcher

Henning Löcken, M.Sc.
 Researcher

Dr.-Ing. Roshan Paul
 Senior Programm-Manager

01.09.2022



The **main objective** of "BioPolyCol" is to develop sustainable bio-dyes with good colour intensity and high fastness for industrial dyeing of biopolymers. Currently, the market is dominated by synthetic dyes that can dye polymers with very good fastness but are only partially taken up due to their limited affinity. The release of large quantities of difficult-to-treat wastewater that takes place in the process causes serious environmental problems.

The textile industry is striving for sustainability, and BioPolyCol aims to apply the untapped potential of bio-dyes. The dyes are derived from renewable plant resources, secondary crops and food industry residues from the Amazon region, without harming the environment. Building

on the know-how and experience of all partners, the goal of this project is to find industrially viable solutions to the inherent drawbacks of bio-dyes (low fastness, low affinity, low heat stability, contamination by metallic mordants, etc.).

On the Brazilian side, plant sources are identified, bio-dyes are extracted and characterized, and dye powders are produced. High fastness and temperature stability are achieved by encapsulation in a silica matrix or by microencapsulation. Thus, the biopolymers are dyed by spinning, masterbatches are prepared, injection moulded and tested.

On the German side, the compatibility of the bio-dyes with spinnable biopolymers will be investigated and further processed into a spinnable compound. Subsequently, white and spin-dyed biopolymer filaments will be produced on an industrial scale. In addition, the production of a knitted fabric will be investigated. The white textiles will be dyed with powder dyes using various ecological techniques (using hydrolyzed proteins, eco-mordants, etc.) and treated with nanofinish to achieve high fastness and self-cleaning properties.

The second goal is to establish mutually beneficial bilateral cooperation on bioeconomy. Scientific exchange will be ensured through two conferences. The high added value product prototypes will enable BEPLAST and BACHE to enter the German/Brazilian market. BioPolyCol does not target the mass market but a high value niche market for footwear and sportswear by developing and commercializing biopolymers with "Amazonian bio-dyeing".

Appropriate socio-technological measures will be taken to maintain a sustainable supply of bio-dyes after the completion of the project. It is estimated that a 10 % market share of bio-dyed biopolymers would lead to a 2-3 % reduction in the environmental problems associated with synthetic dyes. After validation on footwear and sportswear, the results will be transferred to baby clothes, home textiles, etc. in the future.

Acknowledgement

We would like to thank the German Federal Ministry of Education and Research for funding the project in the funding program "Bioeconomy International 2021".

SPONSORED BY THE



Federal Ministry
of Education
and Research

Contact

Dr.-Ing. Franz Pursche

Telephone: +49 241 80 23268

E-Mail: franz.pursche@ita.rwth-aachen.de