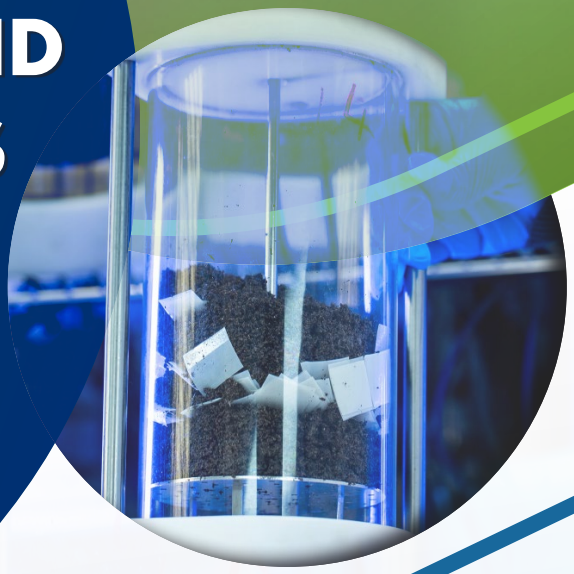
BIOPLASTICS AND BIOCOMPOSITES PLATFORM CAPABILITIES



science, technology & innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

CSIR
Touching lives through innovation

The CSIR Bioplastics and Biocomposites platform within the Advanced Polymer Composites research group based in Pretoria offers integrated access to three key research and development components: scale-up facilities, well-equipped characterisation laboratories, and multi-disciplinary researchers.

The platform has access to a polymer processing pilot-scale facility specifically designed to enable the transition from laboratory to industrial scale and ultimately industrialisation of products and technologies.

CORE FOCUS AREAS

- Development of bio-based and compostable materials for the replacement of single-use plastics that are not recycled.
- Valorisation of biomass waste residues and conversion to value-added composite products.
- Establishing end-of-life options (recycling/upcycling/organic recycling) for materials to ensure implementation of circular solutions for the plastics sector.

OUR TEAM

The Bioplastics and Biocomposites team consists of researchers, polymer engineers and technologists, and materials scientists who apply their knowledge to assist enterprises from prototype to pilot-scale production.

BIOPLASTICS AND BIOCOMPOSITES INFRASTRUCTURE AND CAPABILITIES

The Bioplastics and Biocomposites infrastructure comprises state-of-the-art polymer processing and characterisation laboratories and two specialised testing facilities: biodegradation testing, and a fire, smoke, and toxicity testing laboratory.

BIODEGRADABLE POLYMER FORMULATIONS

The platform has developed modification processes and a series of biodegradable polymer plastic formulations tailored for both flexible and rigid applications in packaging, agriculture, and medical device casing. The formulations contain up to 40% (per weight) locally derived natural materials and industrially compost fully into carbon dioxide, water, and biomass, without the release of toxic residues.

COMPOSTABLE AGRICULTURAL MULCH FILMS

The team has developed bespoke, fully biodegradable mulch films (BDMs), which have all the benefits of conventional plastic mulches but are soil biodegradable at the end of the crop lifecycle. Conventional plastic mulches result in harmful microplastics on farms and must be removed at the end of the crop lifecycle and disposed of at cost. In contrast, the BDMs are ploughed back into the soil after harvest to biodegrade into carbon dioxide, water, and soil-enriching biomass, thus saving on removal and disposal costs. The developed BDMs are undergoing field trials in South Africa, Nigeria, and Ghana.

COMPOSTABLE BIOMEDICAL DEVICES

The technology focuses on the development of compostable biomedical devices – diagnostic kits and surgical aprons – that comply with the technical specifications of conventional plastic biomedical devices and are biodegradable in industrial composting conditions (90% biodegradation within 120 days). Pregnancy and HIV lateral flow tests by biomedical device manufacturers were successful.

The developed prototypes meet the ASTM D6400 and ISO 17088 international standards for compostable plastic requirements. Compared to conventional plastics that have persisted in the environment for over 100 years, the developed technologies biodegrade within 120 days into non-toxic residues such as carbon dioxide and water.

OFFERING TO INDUSTRY

Local industry is invited to engage with the team to enhance their competitiveness by developing bio-based and compostable products for localisation, imparting functional properties to existing products, and conducting biodegradation testing of imported products.

WORK WITH US:

FOR MORE INFORMATION, PLEASE CONTACT:

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LET'S COLLABORATE AND BUILD A SUSTAINABLE FUTURE TOGETHER!