



Council for Scientific and Industrial Research (CSIR)

Natural Resources and the Environment (NRE)

Durban, South Africa

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Title:	Biosynthesis of polyhydroxyalkanoate (PHA) and poly lactate polymers by recombinant bacteria on mill sludge
Abstract:	<p>Pulp and paper mill sludge is a waste stream from mill operations that is presently landfilled or spread over agricultural land. The disposal of this waste stream is becoming a challenge, due to reduced capacity of existing landfill sites, difficulty in opening new sites because of strict legislation, leaching of toxic materials into surrounding ground and water, and a growing public awareness about unwanted greenhouse gas emissions. Therefore, a topic of growing concern by industry is disposal of this waste in an environmentally friendly and economically feasible manner. To this end, the aim of this study is to convert mill sludge into biopolymers for use in, for example, packaging applications. The route of biopolymer synthesis will incorporate a biological process viz., microbial fermentation. Microorganisms synthesise polymers using the monomers generated by inherent and/or engineered metabolic pathways of host strains from various carbon sources. Microbial fermentation results in direct synthesis of corresponding polymers that are accumulated in the host strains or are excreted into the culture medium. The novelty of this work is creating a process to produce biopolymers in a one-step process using a genetically modified micro-organism. The project forms part of a Ph.D. study and is in the second year of completion.</p>
Lead institution:	CSIR
Partner institutions:	UKZN, Durban University of Technology, Sappi, Kimberly-Clark, Mondi
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Principal Investigator:	Prof. Bruce Sithole
Degree:	PhD
Funded by:	CSIR, DST Biocatalysis Initiative
Start date:	April 2015
End date:	March 2018
Feedstock:	Pulp and paper mill sludge
Value chain products:	PHA and PLA
Geographic source of the feedstock:	Mpumalanga and KZN