Centre for Bioprocess Engineering Research
University of Cape Town (UCT)
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Title:	Value From Waste: Reactor selection in the production of valuable bioproducts from wastewater
Abstract:	Industrial, municipal or domestic wastewater contains sources of nutrients, which microorganisms are able to metabolise. There is the potential for the production of biodegradable products by microbial means, while still producing clean water, or partially treated water, from the wastewater streams. A challenge in producing these products, however, is the volume and nature of these waste streams. One way of achieving this is by adapting the reactor design and reactor conditions to take into account these factors, whilst operating under non-sterile conditions. This research investigates and motivates the selection of two reactor configurations suitable for the processing of the dilute wastewaters in wastewater treatment plants with concomitant production of a valuable product, recognising the need for obtaining high biomass retention and product recovery from dilute streams at high flowrates. These reactors are the Moving Bed Biofilm Reactor and Aerobic Granular Sludge in a Sequencing Batch Reactor. The selection criteria for the reactors was based on their suitability to be implemented in a wastewater biorefineries application by decoupling solid and hydraulic residence times, and whether the reactors produce a product in a different phase that reduces the downstream processing load. The operational aspects of the reactors will focus on optimising the product formation through maximised biomass retention, ease of product recovery, minimising operating expenses and non-sterile operating conditions, from synthetic wastewater, to ensure dominance of the *Bacillus* species selected to achieve product formation.
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Partner institutions:	Water Research Commission (WRC)
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Degree:	MSc. Chemical Engineering
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Start date:	February 2014
End date:	August 2016
Feedstock:	Wastewater; minimal media
Value chain products:	ɣ-Polyglutamic acid
Geographic source of the feedstock:	Various, across South Africa