MELiSSA project 'FDU: Fibre Degradation Unit'

R&D position announcement for a project engineer in microbial waste treatment engineering

PROFILE SELECTION CRITERIA

Background and experience

- Possession of a MSc or PhD degree in environmental engineering, microbial ecology or biochemical engineering is mandatory
- Experience with operating (anaerobic) bioreactors is mandatory
- Experience with project organisation is considered mandatory
- Persons from any nationality are welcomed to apply.
- Affinity for space applications, anaerobic fermentation, organic waste treatment, anaerobic digestion, nitrification and/or source-separated wastewater, as well as for bioreactor operation and performance analysis is considered as a plus.

Scientific knowledge and skills

- Ability to rigorously design and perform experiments in a result-oriented and thorough manner.
- Ability to perform in-depth and critical data analysis.
- Ability to communicate through high-quality scientific channels, e.g. peer reviewed publications (A1).
- Potential to contribute to research program development.

Personal knowledge and skills

- Creative, out-of-the-box thinker
- Excellent interpersonal skills to work effectively and closely with team members and MSc students from different backgrounds.
- Excellent skills for time management and the ability to meet objectives within strictly set deadlines.
- Outstanding oral and written communication skills in English are strictly required.
- Demonstrated ability to work efficiently and with minimum supervision.
- Outcome focused, hands-on mentality.
- Willingness to travel internationally for project meetings and conferences.

JOB DESCRIPTION

The FDU project

During long duration human space missions the re-supply of food and water from Earth is restricted. The presence of a life support system, which enables the regeneration of oxygen, recycling of water and processing of waste streams, is therefore essential. In this context ESA designed MELiSSA, a bioregenerative life support system for the complete recycling of gas, liquid and solid waste products. This nutrient recycle system consists of a sequence of compartments (see Figure below).

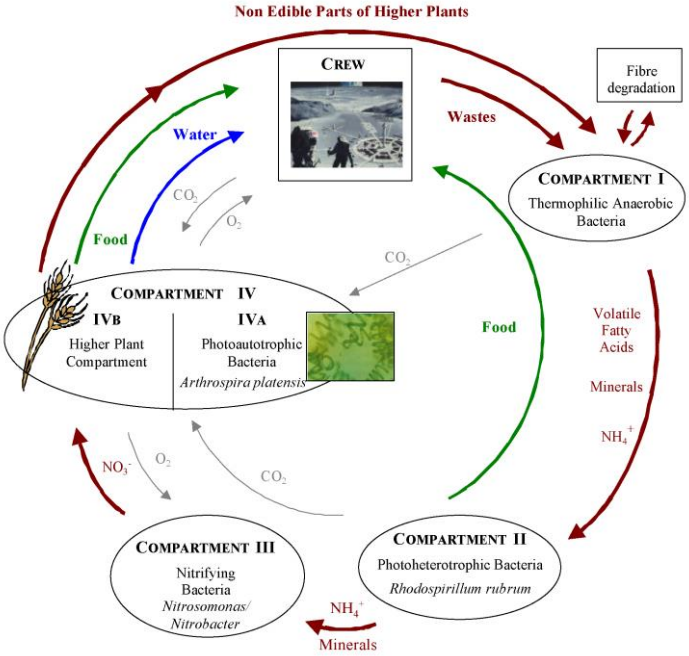

Figure: Overview of the ESA life support system MELiSSA

A major challenge, at this moment, for the MELiSSA loop is closing the carbon cycle, by completely oxidizing the carbon in the organic waste and non-edible parts of the plant into CO_2 for the higher plants and algae to fix again and thus to produce food. A wide range of physical, chemical and biological processes has been tested. However, the oxidation of fibrous material (mainly cellulose, lignin and hemicellulose) remains challenging. In the fermentation step (CI) operated as a membrane bioreactor to improve biodegradation, the fibre degradation efficiency is only between 15-30%. With the help of high temperature and pressure, sub- or near critical water conditions proved to be promising for degradation of fibrous material. The addition of an oxidant (hydrogen peroxide, H_2O_2) under sub- or near critical conditions further enhanced the oxidation to CO_2. In this project, the aim is to demonstrate that sub-, near- or supercritical oxidative water conditions are able to convert organic compounds completely into CO_2.

The different tasks will be elaborated by the following other project partners.

The tasks of the project engineer we are looking for in this project (phase 1) include organising waste preparation and pre-treatment, running (intensive follow-up and characterisation) of an anaerobic fermenter (suppressed methane production) to ferment the waste so that it can be used for the hydrothermal treatment (by another project partner).

Type of employment

- Full time, fixed term appointment for 1 year (phase 1). If the results are in line with the expectations of the customer (ESA), phase 2 might be granted, which will last 1,5 year extra.
- A competitive salary is offered, salary levels account for years of professional experience.
- Ghent University is an equal opportunity employer.

ABOUT LABMET

The **Laboratory of Microbial Ecology and Technology** (LabMET; www.LabMET.UGent.be) is part of the Faculty of Bioscience Engineering at Ghent University, with a global ranking within the top 100 of best universities (Shanghai ranking), and a premium position within the top 50 of best Life Sciences institutes (Times Higher Education ranking). Under the initial lead of prof. em. dr. ir. Willy Verstraete, LabMET has over 35 years of experience in the study of applied microbial processes and microbial ecology in the contexts of waste(water) treatment, bioremediation, bioproduction and resource recovery. It is one of the top performing laboratories worldwide in its field and links excellent basic science with application, leading to a high level of peer reviewed outputs besides commercial outcomes including 7 spin-off companies over time. Reactor and process developments go from millilitre scale to full scale industrial.

At present, the group has 4 academic staff (Nico Boon, Tom Van de Wiele, Korneel Rabaey, Siegfried Vlaeminck).

Korneel Rabaey is regarded as one of the pioneers in the domain of bioelectrochemical systems. His group presently focuses on four key themes, being (bio)electrochemical recovery and conversion of inorganics, (electro)fermentation, microorganism – electrode interactions and microbial electrosynthesis. These processes are studied using a combination of engineering, microbial and physico-chemical approaches.

Since 1998, with the development of the OLAND (oxygen-limited autotrophic nitrification/denitrification) process, LabMET has housed a group devoted to the development of sustainable nitrogen treatment biotechnologies, currently headed by **Siegfried Vlaeminck.** The nitrogen R&D group is currently involved in several projects relevant to this proposal including the resource-oriented treatment of source-separated and end-of-pipe wastewater, manure and aquaculture effluents, with a dedicated focus on overall sustainability, energy efficiency and greenhouse gas emissions. These developments are both elaborated for terrestrial as well as for space applications.

Dr. Peter Clauwaert is bio-engineer with experience in bio-electrochemical systems and nitrogen conversion technologies. As the ESA project manager at LabMET, he is currently focussing on the development of a urine nitrification bioreactor for space application in combination with grey water recycling (WTUB project).

APPLICATION PROCESS

Submission and closing date

Applications must be sent via email to LabMET.Recruitment@UGent.be as pdf or word documents, with in the subject line mentioning **"Job Application – FDU – Anaerobic fermentation".** Final closing date is **Friday February 6th 2015 12h Belgian time,** but applications will be regularly reviewed prior to the deadline hence early application is recommended.

Three *application files are expected:*

1. Covering Letter. The covering letter should include:
   - The position reference
   - Your contact address and telephone number
   - A personal introduction highlighting the key reasons you should be considered for the role
   - **The earliest date you are available to start a new job**

2. Resume or *Curriculum Vitae*. A resume is a brief history of your employment and experience that covers the following areas:
   - Educational qualifications and professional affiliations that detail the full title of the qualification, the year awarded and the title of the institution attended;
   - Employment history in chronological order, starting with current position and specifying dates of employment, title of each position, name of employer, main duties or accountabilities and achievements;
   - Research fields and current interests, publications (if any, full list as attachment with **three most significant marked with an asterisk),** research grants awarded and, if applicable, details of teaching evaluation; and
   - The names and contact details (address, telephone, fax and e-mail) of three referees, including if possible a senior person (preferably your supervisor, manager or head of organisational unit) closely associated with your current work. A referee must be able to comment on your work experience, skills and performance with respect to the selection criteria.

3. Selection Criteria. A statement addressing how each of the selection criteria has been met is required to assist the Selection Committee determine whether you have the relevant qualifications, knowledge/skills, experience and personal qualities.

Selection process

An appointed HR Selection Committee will consider all applications and shortlist candidates for interview who appear to meet the selection criteria at the highest levels. They will be invited to attend an interview and the remaining unsuccessful applicants will be notified accordingly.

An invitation to attend an interview provides an opportunity to provide further information to the Selection Committee to substantiate your claims against the selection criteria or demonstrate your capabilities. Please note that interviews may be conducted by teleconference in the first instance.

The Selection Committee will subsequently seek referee reports, if not sought prior to interview, before making a decision to make an offer of appointment to the preferred candidate. The purpose of referee checks is to obtain, in confidence, factual information about your past work history, as well as opinions regarding the quality of your work, behaviour in the work place and suitability for the position. Referee reports may be sought orally, or for academic staff, in writing by post or e-mail.

If you are the preferred candidate, you will receive a written offer of appointment to the position. Do not take any action, such as resigning from your current position, before you receive a written offer of appointment.

More information

Dr. Peter Clauwaert, peter.clauwaert@ugent.be, ++32 9 264 59 78

Prof. Dr. Korneel Rabaey, korneel.rabaey@ugent.be

Prof. Dr. Siegfried Vlaeminck, siegfried.vlaeminck@ugent.be