

Project title: Fungal Degradation of Plastic

Solent University, School of Sport, Health and Social Sciences.

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Closing Date: 13th September 2019

Fees only MPhil (UK/EU applicants only)

Project Description

This opportunity focusses on utilising filamentous fungi to degrade plastic. The widespread use of plastic has revolutionised life for many, however the impact of this is a significant global accumulation of waste that is highly recalcitrant to breakdown. 348 million tonnes of plastic were produced globally in 2017, with a significant proportion of collected plastic waste going to landfill in Europe (1). It is known that some microbes can initiate degradation of petroleum-based plastics with some success (2, 3, 4), but the processes and pathways the microbes use to achieve this are still poorly understood.

Research Aims

The project will build on initial findings of the PI, using filamentous fungi to initiate degradation of a variety of plastics, including high density polyethylene – a common plastic that is extremely recalcitrant to breakdown. The physico-chemical changes to the plastic during microbial degradation will be characterised. A variety of proteomics methods will be used to assess which microbial pathways are active, and characterise the enzymatic response to plastic degradation.

Candidate requirements

The successful candidate will possess at least a 2:1 degree in a biological discipline and be able to demonstrate significant interest and understanding in the field of microbiology. Experience with microbiological laboratory techniques would be an advantage.

Potential applicants are strongly advised to contact the PI for informal discussions.

The anticipated start date will be January 2020

Research environment

Dr Suzy Moody is establishing a new Environmental Microbiology Research Group at Solent University, with expertise in both bacterial and fungal systems. This project is offered in collaboration with Dr Ed Dudley of the Department of Biochemistry at Swansea University. The student will be primarily based at Solent University in Southampton, but will benefit from undertaking some visits to Swansea University to conduct elements of research.

With a population of around 11,000 staff and students, **Solent University** is home to one of the world's leading maritime schools.

How to Apply

Applications can be made via the Solent website: <https://www.solent.ac.uk/research-innovation-enterprise/research-degrees/applying-for-a-research-degree>

Expected interview date in October 2019

Funding Notes

The UK/EU tuition fees for the MPhil are funded, a stipend is not included. It is available to UK/ EU applicants only.

References

1. Plastics - the facts 2018. An analysis of European plastics production, demand and waste data [online]. Association of Plastics Manufacturers, Brussels, Belgium. Plastics Europe. 2018. Available from <https://www.plasticseurope.org/en>.
2. Balasubramanian V, Natarajan K, Rajeshkannan V, Perumal P. Enhancement of in vitro high-density polyethylene (HDPE) degradation by physical, chemical, and biological treatments. *Environ Sci Pollut Res Int*. 2014. Nov;21(21):12549-62. doi: 10.1007/s11356-014-3191-2.
3. Montazer Z, Najaf M, Levin D. Microbial degradation of low-density polyethylene and synthesis of polyhydroxyalkanoate polymers. *Can. J. Microbiol*. 2019 65: 1–11 (2019) [dx.doi.org/10.1139/cjm-2018-0335](https://doi.org/10.1139/cjm-2018-0335).
4. Paço A, Duarte K, da Costa JP, Santos PS, Pereira R, Pereira ME, Freitas AC, Duarte AC, Rocha-Santos TA. Biodegradation of polyethylene microplastics by the marine fungus *Zalerion maritimum*. *Sci Total Environ*. 2017. May 15;586:10-15. doi: 10.1016/j.scitotenv.2017.02.017.