

E&I Research Studentship project proposal 2019

Project title: Plastics in the Air: Quantifying sources with novel detection methods

Supervisory team:

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Project Highlights:

- Contemporary environmental issue investigated with extensive UK based field work;
- Multidisciplinary (chemistry/biology) laboratory opportunities;
- Aspiration to develop new quantification technologies (e.g. cameras and drones).

Project Description:

More than 300 million tonnes (Mt) of plastic is produced each year, with an estimated 8300 Mt of virgin plastic produced to date[1]. Most of this plastic is derived from fossil fuels and is non-biodegradable, therefore the only way to eliminate or recycle it is with a thermal treatment. The durable nature of plastic is a highly desirable characteristic for many applications (e.g. medical, packaging, construction), however this long-lived property presents a problem if plastic contaminates the environment.

Plastic pollution in the sea has received a tremendous amount of publicity recently[2, 3]. An emerging area of investigation however is the presence of plastics in the air (Figure 1). The sources and extent of this contamination is currently unknown, with very few published scientific papers on this topic. To date, it's clear that fibrous microplastics are present within internal environments, which are likely to originate from clothing and textiles [4], but the extent of this issue has not been fully investigated. Moreover, the potential harmful effects of plastics in the air is also unknown.

A project in this area would suit a person who has a physical sciences, biology or engineering background. This project would be multi-disciplinary, therefore there would be a requirement to learn a wide range of cross disciplinary techniques under the supervision of experts. Experience using programming languages

would be advantageous, but not essential. Research in this area could be tailored to the skills and interests of a successful applicant. A student would join a well-established environmental and analytical team researching plastic waste materials at the Open University. Please contact Dr Carl Boardman (Carl.Boardman@open.ac.uk) for further information.

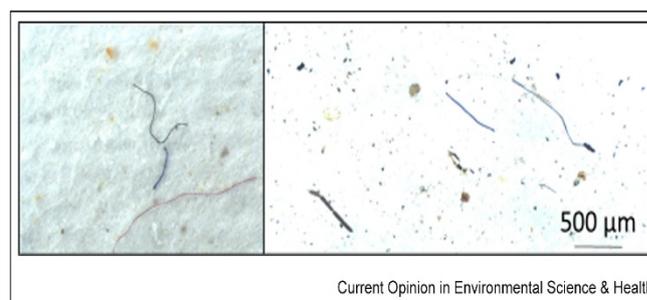


Figure 1: Fibrous microplastic measure in the air. Source: Gasperi, J. et al. 2018.

Indication of project timeline:

Year 1: Establish the focus of the PhD and undertake training on analytical techniques and generic PhD related skills.

Year 2: Field-work intensive year dedicated to generating and analysing original data. Opportunity to attend national academic and industrial conferences.

Year 3: Year is dedicated to writing up the thesis with the expectation of handing in within 3 years. Opportunity to attend an international conference.

References

1. Geyer, R., J.R. Jambeck, and K.L. Law, *Production, use, and fate of all plastics ever made*. *Science Advances*, 2017. **3**(7): p. e1700782.
2. Haward, M., *Plastic pollution of the world's seas and oceans as a contemporary challenge in ocean governance*. *Nature Communications*, 2018. **9**(1): p. 667.
3. BBC. *Plastic Action*. 2018 11/1/18]; Available from: <http://www.bbc.co.uk/programmes/articles/11CnCQR0GJfkDgJs57sR5Ps/plastics-action>.

4. Gasperi, J., et al., *Microplastics in air: Are we breathing it in?* Current Opinion in Environmental Science & Health, 2018. **1**: p. 1-5.

Candidate Applications

- 1000 word cover letter outlining how they are equipped in their educational background and expertise to conduct the research project,
- a CV including contact details of two academic references
- An Open University application form, downloadable from:
<http://www.open.ac.uk/postgraduate/research-degrees/how-to-apply/mphil-and-phd-application-process> (Note: This is an Advertised studentship and you do not need to submit a proposal).
- IELTS English Language test scores on application. An average of 6.5 and no less than 6 in anyone of the four components. Applicant should have these results when applying.

Applications should be sent to STEM-EI-Research@open.ac.uk by 28 February 2019