Introductory Course on Microplastics

Short course on micro-plastics for Graduate students, PhDs and Post docs

May 8th 0900-1700

Venue: Institute of Marine Research, Nordnesgaten 50, Bergen

Organizers: Bjørn Einar Grøsvik and Tanja Kögel (Institute of Marine Research, Marte Haave (NORCE, Norwegian Research Centre AS), Scott Gallager and Mark Hahn (Woods Hole Oceanographic Institution)

Introduction

Plastic waste is a major global issue. Many organisms ingest microplastics. But where and to which extent does it accumulate and harm ecosystems? This short course will provide a theoretical and practical introduction to the scientific questions concerning the global increase in environmental plastic pollution, and investigate the role of particle size in microplastic uptake by organisms. The lectures will introduce the global challenges related to plastic pollution, how they progressed in recent years and as we understand them today, and discuss future research needs and knowledge gaps. Topics covered: Plastic polymer chemistry, environmental sampling and analytical methods, effects of microplastics on marine organisms, needs for risk assessment for environmental and human health. There will be time to communicate with researchers working in each field. The course will also encompass a practical session, with a demonstration of analytical methods in the laboratory as well as critical reading and discussion of published literature.

General plenary talks at Pynten

0900 Why are we concerned? - Discussion of current knowledge and knowledge gaps based on reviews of recent reports. *Geir Wing Gabrielsen, Norwegian Polar Institute*

0930 Global occurrence, sources, distribution and fate of plastic in the environment. *Bjørn Einar Grøsvik, Institute of Marine Research*

0950 Vertical distribution of microplastics. *Svein Sundby, Institute of Marine Research*

1010 The importance of the smaller size-classes - implications for food safety and risk assessment. *Tanja Kögel, Institute of Marine Research*

1030 Discussions

1045 Health break

Lectures on Methods for identification

1100 Environmental distribution modelling, sampling and isolation of microplastics in sediments - Examples from Byfjorden. *Alessio Gomiero, NORCE, Norwegian Research Centre AS*

1120 Methods for identification of plastic polymers - theory and practice microFTIR and Pyrolysis-GC/MS-Orbitrap. *Ørjan Bjorøy, Institute of Marine Research*

1140 Raman identification. *Scott Gallager Woods Hole Oceanographic Institution*

1200 Panel discussion with questions by attendees

1230 Lunch at IMR

1330 – 1600: Discussion and practical work (group rotation) 5 students per group

Group discussion Group 1 and 2
Location: Big and small meeting room 3 floor, Likevekten, 2 floor (1 hour)

Critical reading: read and discuss curriculum papers

Read and discuss a selection of recent microplastics papers. *Tanja Kögel and Bjørn Einar Grøsvik (IMR, Norway).*

Group 3, 4 and 5: Practical work (IMR)

Group 3: Extraction/isolation of particles in sediments
Location: Chemistry lab (30 min) *(Alessio Gomiero)*
Theory on acid/base digestion, enzymatic degradation/clean up, potential for contamination and need for quality assurance measures and control. A brief practical exercise with density separation.
Chances of under/overestimating numbers when using visual sorting.

Group 4: microFTIR and Pyrolysis GCMS
Location: Plastic lab (30 min) *(Ørjan Bjorøy)*

Group 5: Raman Spectroscopy for identification of polymers
Location: Chemistry lab (30 min) *(Scott Gallager)*
Hands on operation of a 532 nm Raman Spectrometer, hand-held 785 nm spectrometer, and a 532 nm flow-through system for large volumes of water. Also, use of a hand-held IR Reflectance spectrometer.

1600 Summing up

Knowledge gaps and research needs.
Student driven, researcher-guided discussion and preparation for the next day

1700 End of day