

Plastic particles and their interactions with other water pollutants

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About the Project

Nano and microplastics are emerging water pollutants released to the environment by diverse products and processes or by the degradation of plastic litter. Plastic particles interact with various chemicals and living organisms, and can readily pass to humans through the food chain, the inhalation and the skin penetration. The smaller the size of these plastic particles the more difficult is to recover them from the environment and for this reason commercially available polymeric particles of specific type (mainly polystyrene) are used in order to conduct studies on their fate and interactions with other environmental components. However, polystyrene particles are not really representative to the actual nature and surface chemistry of these complex water pollutants, and therefore the obtained results for these studies may be misleading.

This PhD activity will point to the fabrication of nanoplastic and submicron particles of diverse polymeric nature, in order to fill the existent gap of knowledge in the nanoplastics field. This will be succeeded by adopting top-down approaches starting from bulk polymeric films and following innovative fabrication methods such as the laser ablation of solid targets in liquid environments. After the complete characterization of the fabricated particles, their interactions with common and emerging water pollutants, such as pesticides, drugs, dyes, heavy metal ions, flame retardants etc. will be investigated, in order to define the most stably interacting systems. Then, the interactions of the formed components with biological systems will be studied in collaboration with other research groups, in order to evaluate the effects that such pollutants can have to the living organisms.

Requirements: The ideal candidate must have a Bachelor's Degree in one of the following areas: Physics, Chemistry, Materials Science.

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