

Optical detection of microplastics in water

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Among pollutants invading waters, microplastics (MPs) have gained a large place. Coming from either industrial water or from discarded degraded pieces of plastics in oceans, MPs are finding a path back to soil and river. Monitoring MPs is important, and we propose optical techniques and methods for this purpose. Robust methods such as Raman and Fourier Transform Infrared spectroscopies are the most reliable methods, but they are often expensive and require a long filtering and sample preparation process. We present here alternatives using a combination of different optical phenomena that we implemented to achieve a portable device. The first device to be presented is based on ultra-high-definition imaging using a commercial device originally conceived for the analysis of pulp in paper factories. The second method is based on hyperspectral imaging allowing us to identify the plastic type directly in water, without pretreatment or filtering. Finally, we will discuss the possibility of integration of methods and extend the scope of the presentation to water monitoring in general using on-chip devices. This collaborative work belongs partly to several projects, namely, Research Council of Finland flagship PREIN, Horizon Europe project IBAIA, and Business Finland project CEIWA.

Short biography:



Matthieu Roussey is leading the integrated optics and sensing group (about 15 researchers) of the Center for Photonics Sciences at UEF in Joensuu. He obtained his PhD from the FEMTO-ST institute (Besançon, France) in 2007. He was team leader in the Optics & Photonics Technology Lab at EPFL (Neuchâtel, Switzerland) from 2007 to 2011. Since 2011, he has been working as a senior researcher at UEF, from which he obtained a tenure track position in experimental photonics in October 2016. In October 2020, he obtained the position of full professor. His research topics include dielectric surface waves, novel platforms

for integrated optics, complex integrated devices, environmental monitoring. He is in the board of directors of the European Optical Society since 2017.