# Microplastic Sensor Development

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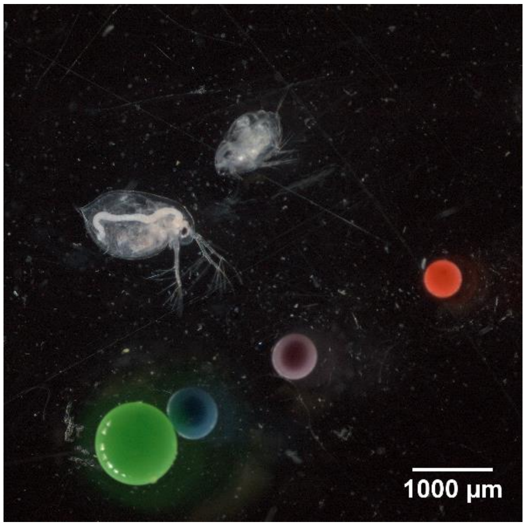
Microplastic measurements are incredibly labor-intensive: first, large volumes of water are filtered in the field. Then, the resulting filters are brought to the lab for digestion to remove organic materials, manual microscope inspection and sorting, and finally polymer identification using expensive techniques such as Fourier Transform Infrared Spectroscopy or Raman Spectroscopy. This time-consuming process limits our ability to monitor microplastics, thereby making it difficult to assess their fate in our waterways and their impacts on the environment. We are developing a microplastic sensor that works directly in water; no manual analysis required.

The microplastic sensor uses impedance spectroscopy to measure the electrical properties of particles in a flow of water. As particles pass between two parallel electrodes, they change the effective impedance. We use the impedance change to count particles, measure their size, and identify their material properties. The impedance change at high frequencies (greater than about 10-100 kHz) for biological particles (e.g. zooplankton) is actually opposite that of plastics, allowing a simple positive/negative or yes/no classification of particles in real time. So far, we have demonstrated the technique works in the laboratory and have been granted a US patent on the technology. We will be working on the next stages of development of the sensor in AVAST, with the goal of producing a field-going sensor by this summer. We are also working towards goals of reducing cost and size, improving usability, and exploring validation methods.




*Left:* A microscope photo of marine organisms (Daphnia and Moina) alongside brightly colored microplastic spheres. We use these for testing the sensor. *Right:* Sarah during a field feasibility test. The next version will be more portable!