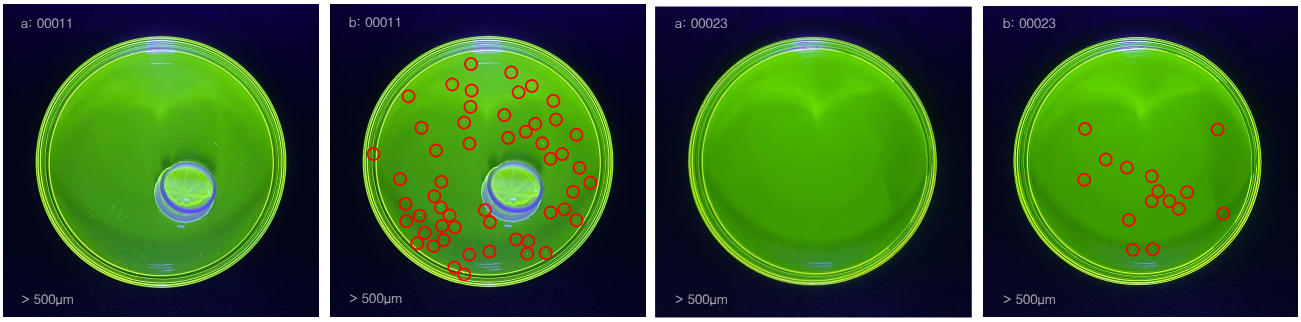
Leading the movement
to eliminate microplastic
from global food supply

NO CUT PACK

Microplastics generated when opening food packaging

Dietary exposure to nano- and microplastic particles has potential negative implications for human health. UV reactive dye specifically binds to plastic particles, and renders them easily visible under a fluorescence microscope. This allows researchers to distinguish microplastics amongst other natural materials and makes it easy to accurately quantify them.



Images of stained microplastic particles photographed under UV light.

Due to its presence in nearly all parts of the biosphere, the potential impact of plastic pollution is not easy to define.

Microplastics are becoming ubiquitous in our environment. They have been detected everywhere from the air and ocean to fresh water and food. MPs can accumulate in the bodies of the animals and humans that ingest them, and have been linked to serious health consequences, including cancer, birth defects and unwanted immune responses.

Respiratory and dietary exposure are thought to be the major exposure routes for mammals, with microplastics potentially causing abrasive lesions and inflammatory responses, releasing adsorbed chemicals, or harboring opportunistic pathogens. It has been suggested that only particles < 20 μm may be able to penetrate into the organs.

A new approach to analyzing these types of samples using Raman microscopy is being trialed at Flinders Microscopy and Microanalysis [1] and is overcoming imaging limitations to help us understand nanoplastics, so we can better manage this emerging environmental and health challenge. Of increasing concern are nanoplastics. While microplastics range in size from 5mm to 1µm, one percent of the width of a human hair, nanoplastics include anything below this.

Our research attempts to answer whether micro- and nanoplastics are created when sealed plastic food packaging is cut open with scissors or a knife.

Microplastic Visualization Method:

1) Cut pack open with kitchen scissors.
2) Place cut sample in sterile petri dish.
3) Cover with ultrapure distilled water and green UV reactive dye solution.
4) Agitate sample, then remove.
5) Illuminate with UV blacklight.

Our research into micro- and nanoplastics generated when opening plastic packaging low-cost microplastic detection was done with minimum sample preparation requirements. Our work shows that opening plastic packages can generate micro-plastics, regardless of the opening approach and plastic target, although the opening approach affects the amount of microplastics generated.

We observed the ubiquity of MPs in a variety of shapes and sizes generated when opening plastic packages. The amount generated is dependent on conditions such as stiffness, thickness, anisotropy and the density of plastic packaging materials.

While the big microplastics can be identified with the naked eye, smaller ones might be also there.

Our study establishes the transference of microplastics upon cutting which enters the food. If microplastics carried into the food are then cooked at high temperatures (350-400˚ F), it is undetermined what chemicals are then emitted and consumed, and what long-term effects will this have on the body.

In the drive to cut costs manufacturers have moved away from 'Peel to Open' packaging to heat-sealed packs. To access the food consumers must use a cutting edge.

The burden of food safety has been placed on the consumer, albeit unknowingly. We have termed this effect Involuntary Plastic Consumption (IPC).

Future studies will elucidate the long term effects of MP uptake on the body, and new insights will be provided into this widespread phenomenon with a particular interest in food safety, security issues, and ultimately human health.

With microplastics generated by ourselves in our daily life as extra sources, we should undertake purchasing responsibility to prevent microplastic contaminations.