

The Mechanical Durability of a Disposable Plastic Spice Grinder

Curtis Dukes

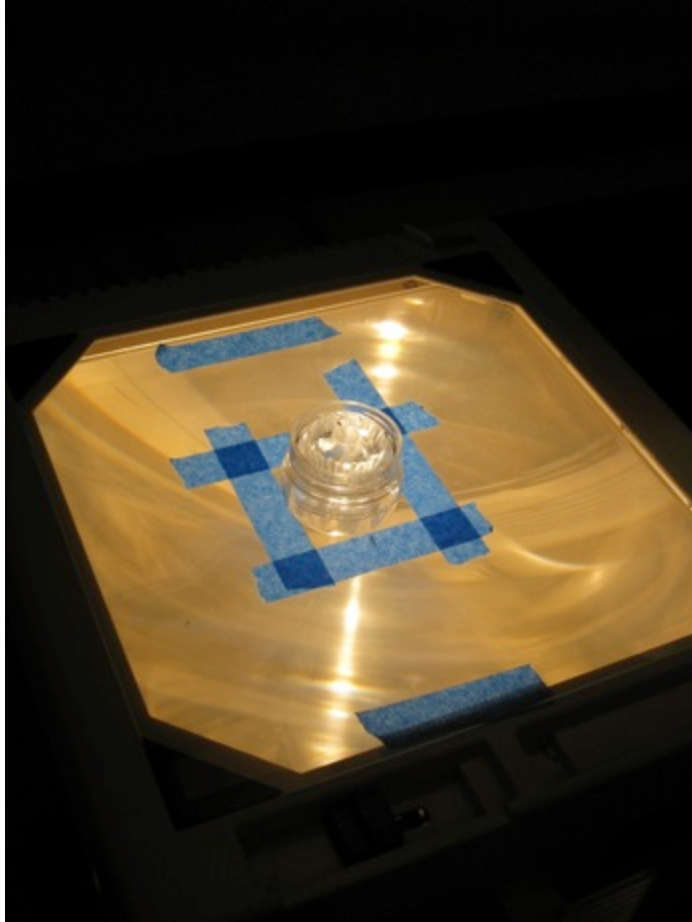
Motivation

- Disposable plastic spice grinders have become very popular.
- Is it possible that mechanical wear will result in pieces of plastic delivered into the food?

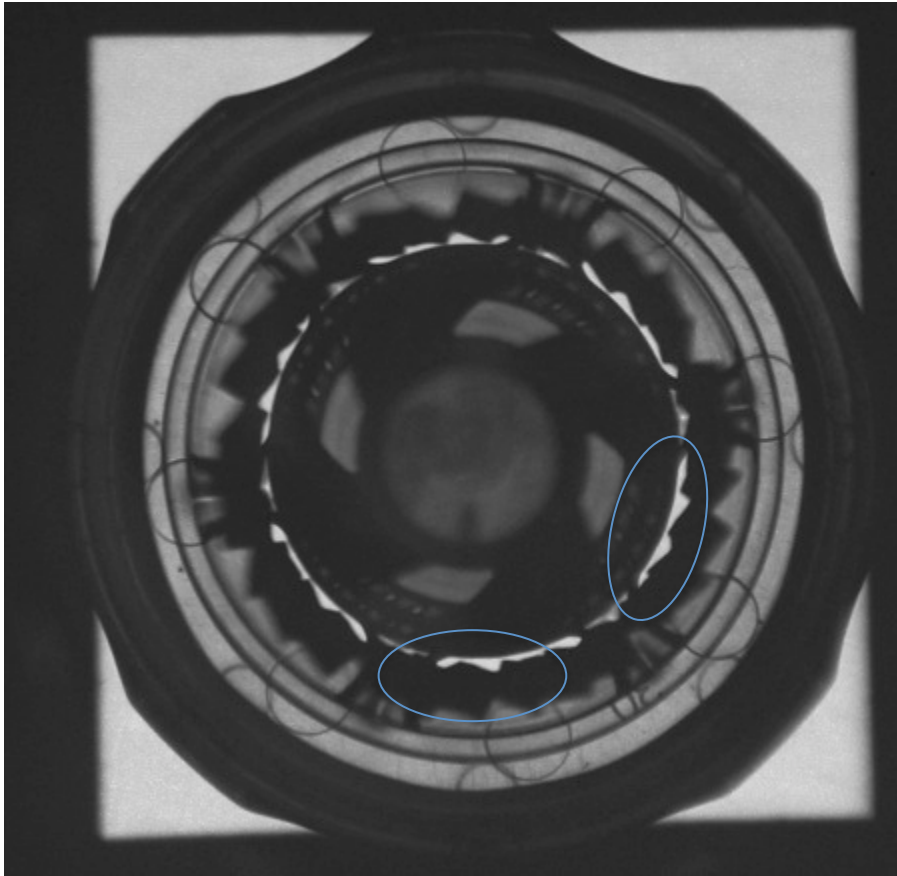
Sea Salt Crystals in Bottle with Grinder Head



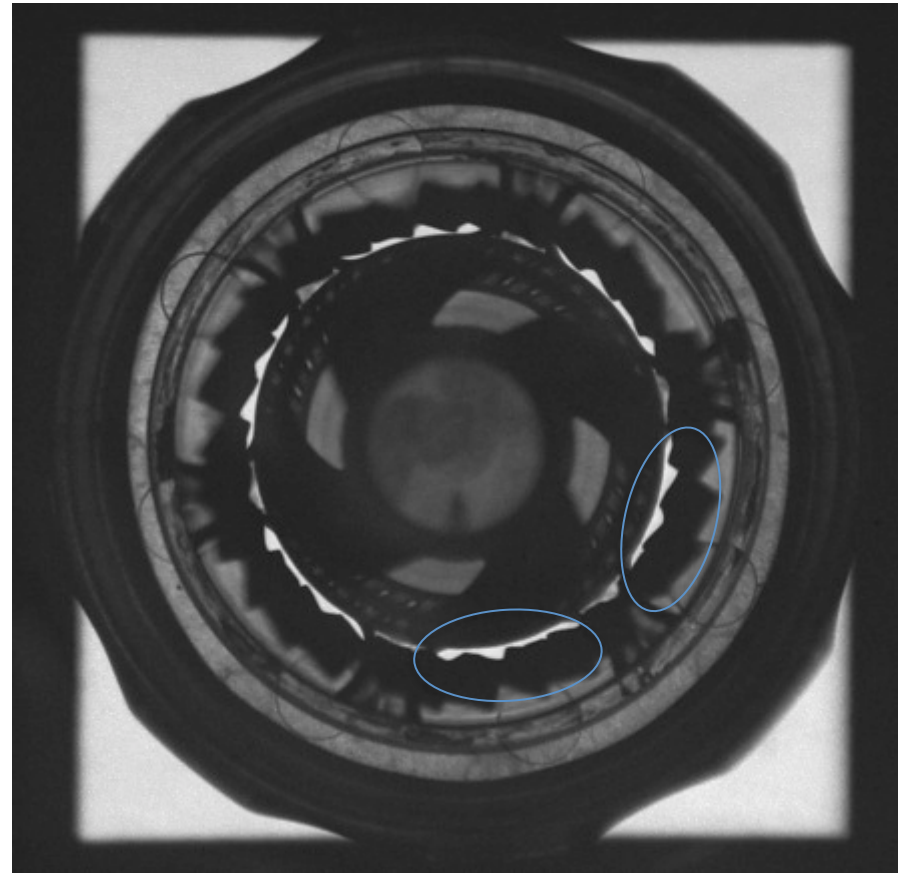
Silhouette Imaging of Grinder Head



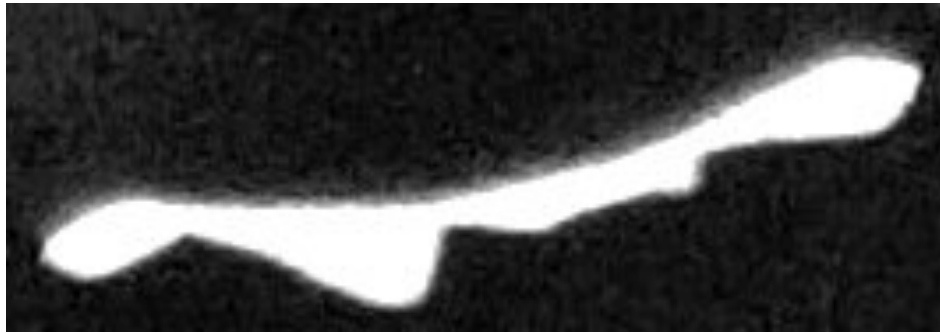
Comparison Before and After Grinding Entire Bottle Contents (ca. 100 g)



Before



After



Before Grind



After 1st Grind

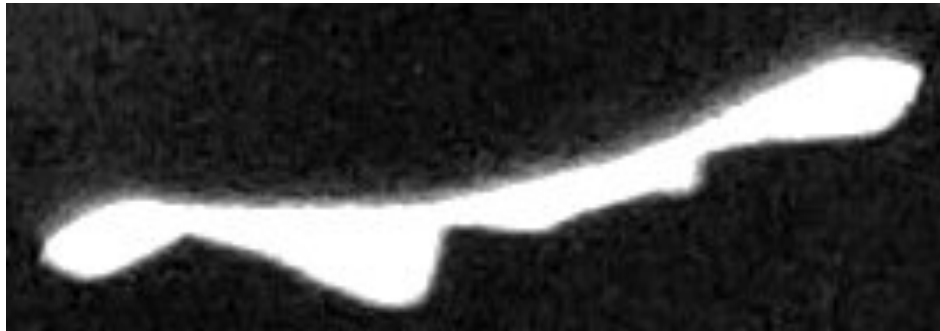


Before Grind



After 1st Grind

Now Grind Contents of Two Additional Bottles Through Original Grinder Head



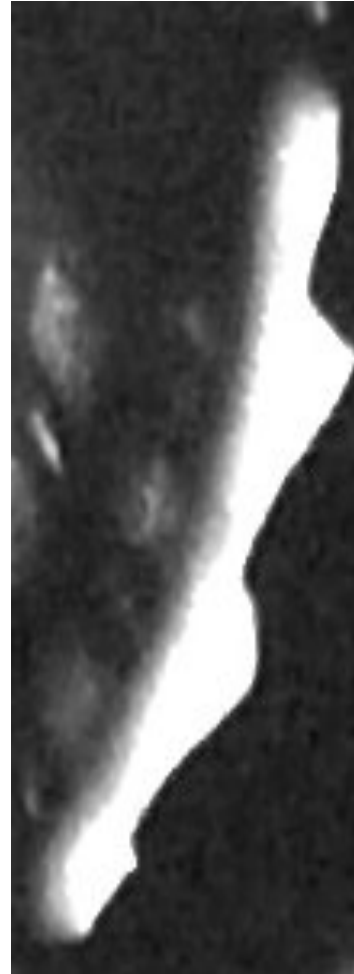
Before Grind



After 3rd Grind

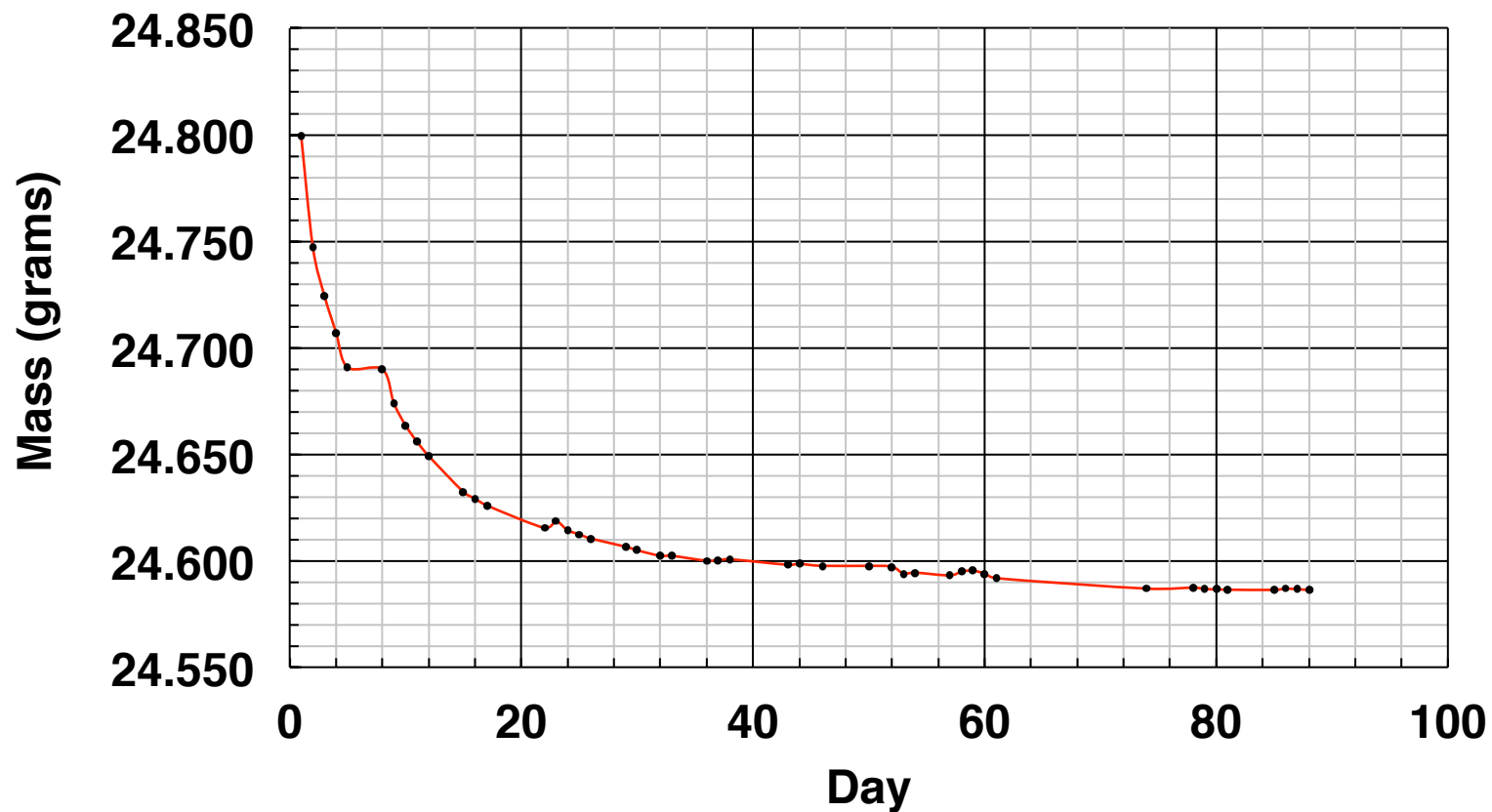


Before Grind

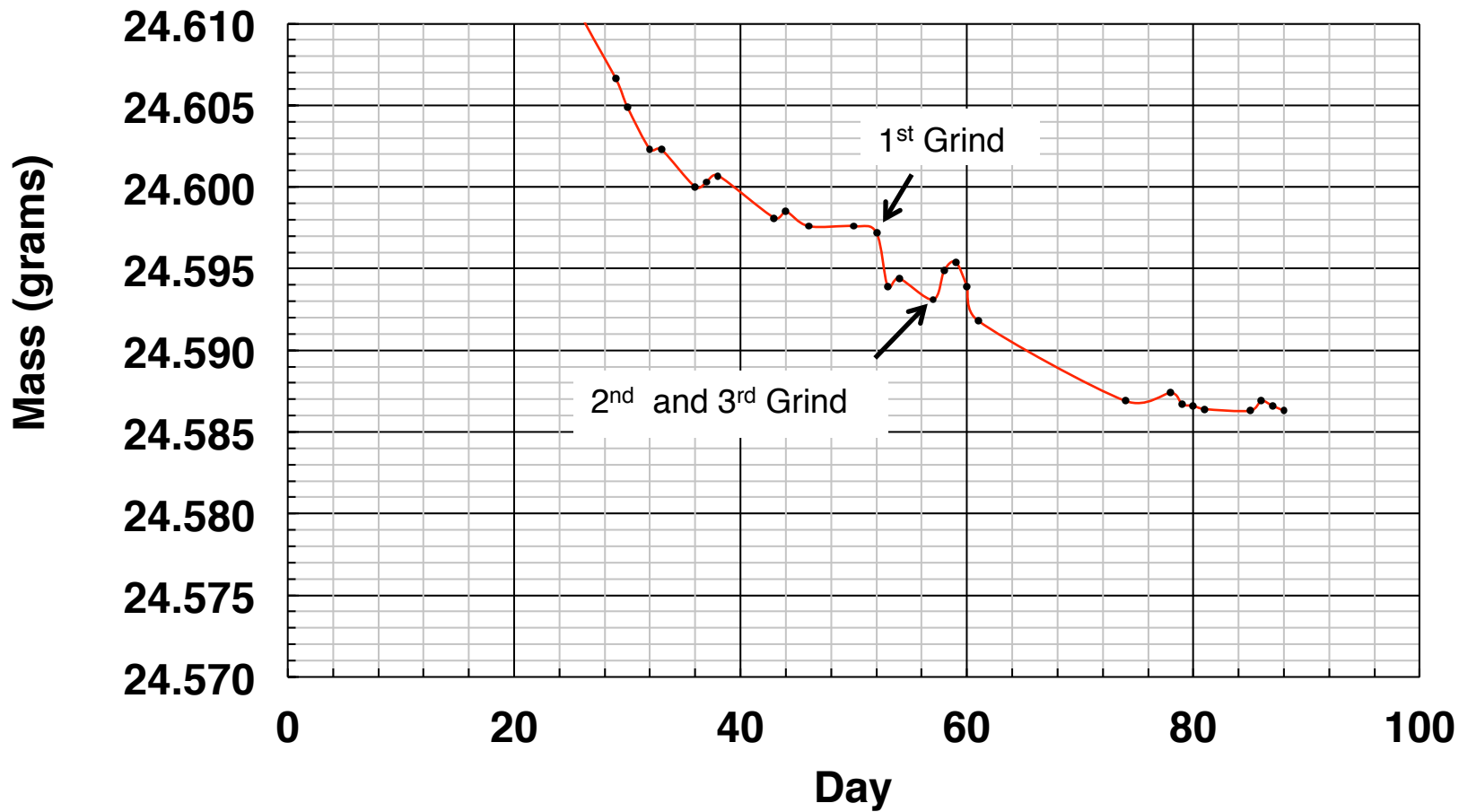


After 3rd Grind

Grinder Head Mass Loss After Shrink Wrap Removal Stabilizes at ca. 1% in 50 Days (Outgassing?)



1st Grind on Day 57 Roughly 3 mg Mass Lost

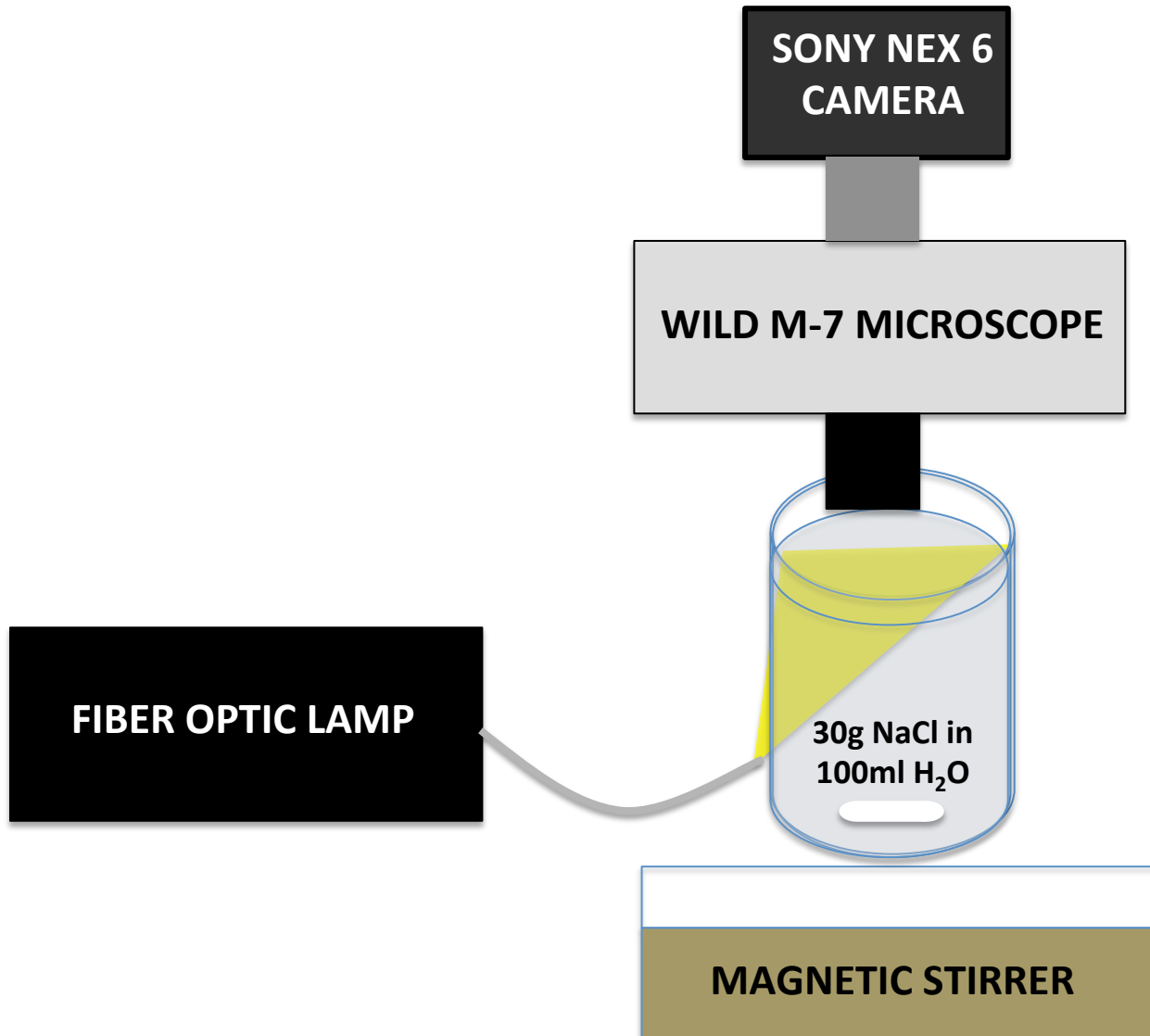


How Can I Directly See the Lost Plastic ?



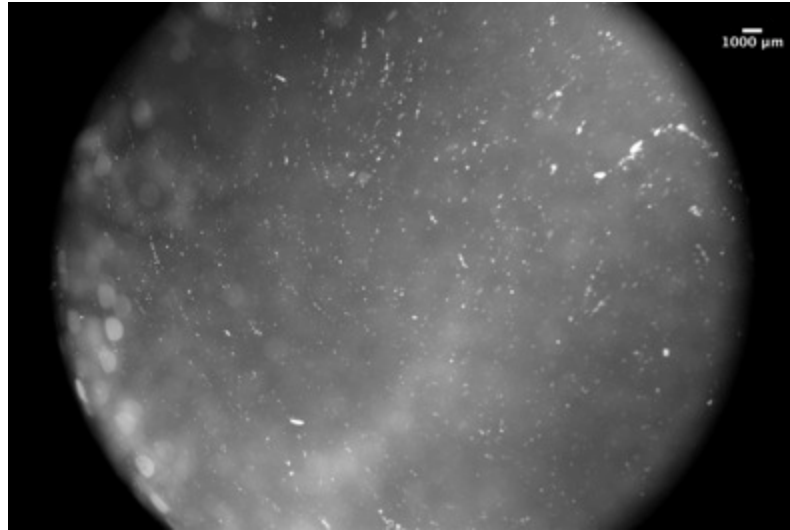
**Plastic Grinder Top Floats in Saturated NaCl Solution
But Not in Distilled Water**

VISUALATION OF FLOATING PLASTIC



Surface of Saturated NaCl Solution

Scale Bar = 1 mm



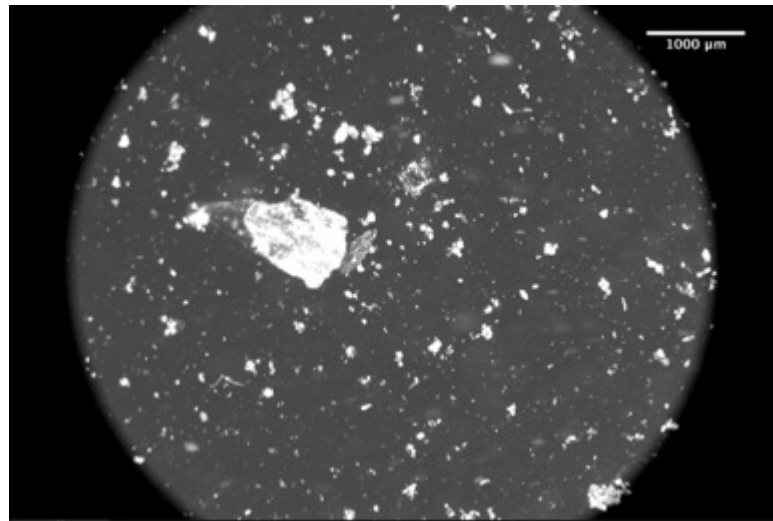
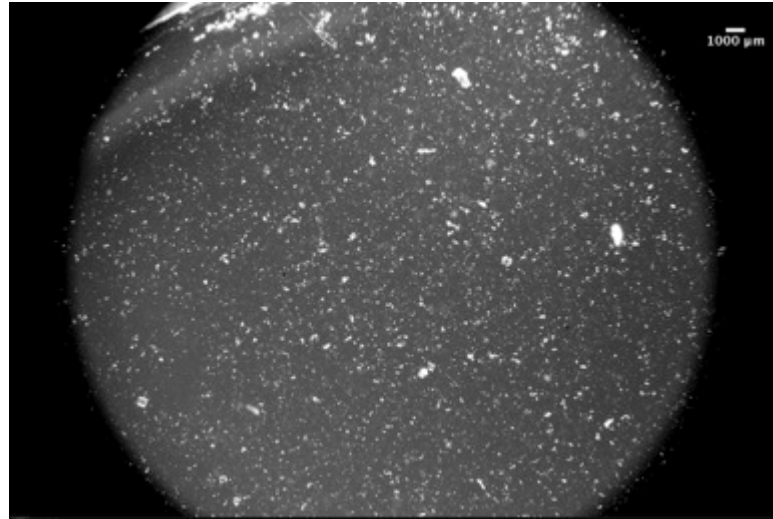
Unground Control



Ground

Floating Plastic Under Hi and Low Magnification

Scale Bar = 1 mm



Eating a little bit of plastic, it passes right through you?

Often salt is directly applied to food and subsequently cooked at high temperature, then what?



Conclusions

I have provided 3 lines of evidence that a plastic grinder delivers plastic into the ground product:

- 1. Visual signs of wear on the grinder blades.**
- 2. Mass Loss: ca. 3 mg per 100 gram salt ground.**
- 3. Microscopic visualization of plastic debris floating on dissolved ground product.**

My work raises concerns about ingesting plastic, particularly after cooking at high temperature such as in the case of broiling or frying food.

Reference Brass Mass Shows Milligram Stability

