

Designing a system for examining microplastic release in fabrics made from recycled materials

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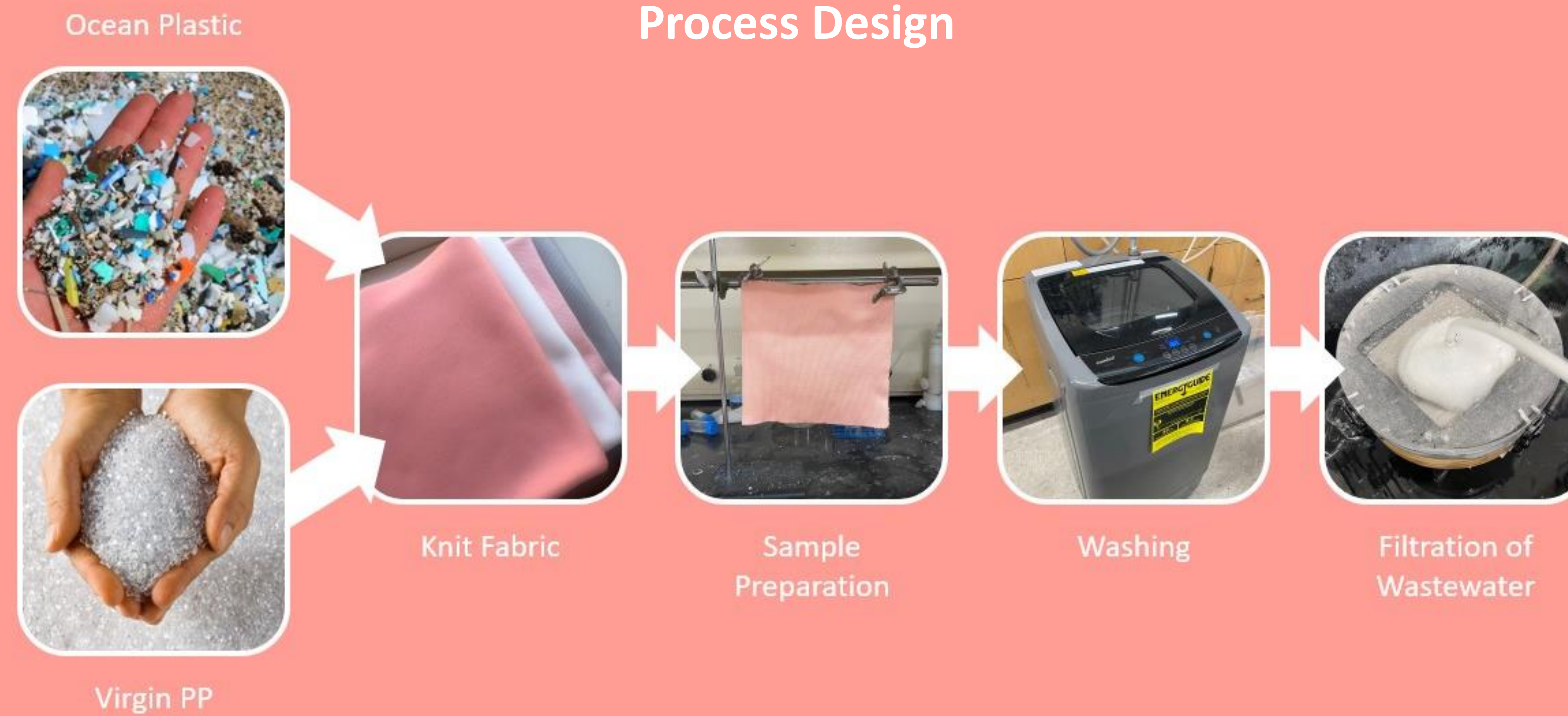
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Background

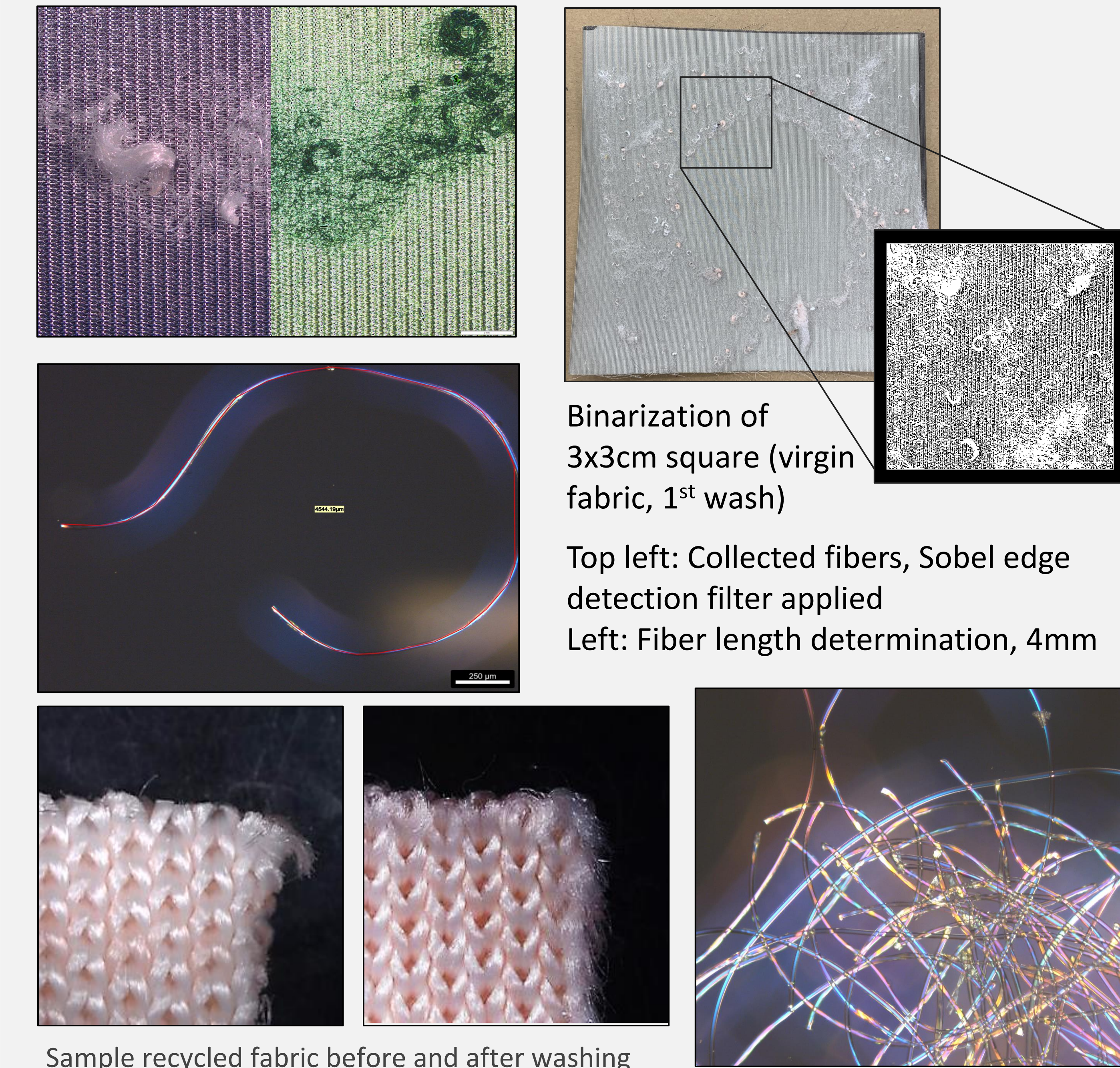
Microplastics are defined as plastic particles smaller than 5 millimeters but can be as small as 10 microns in size and can take decades to fully degrade, posing a significant problem for the environment¹. Additionally, recent studies show that up to 35% of microplastics in the oceans result from laundry of synthetic fabrics². Because of the increasing concern around this issue, our goal was to examine the extent of microplastic release from fabrics made from recycled plastics, to understand their full environmental impact.

Objectives

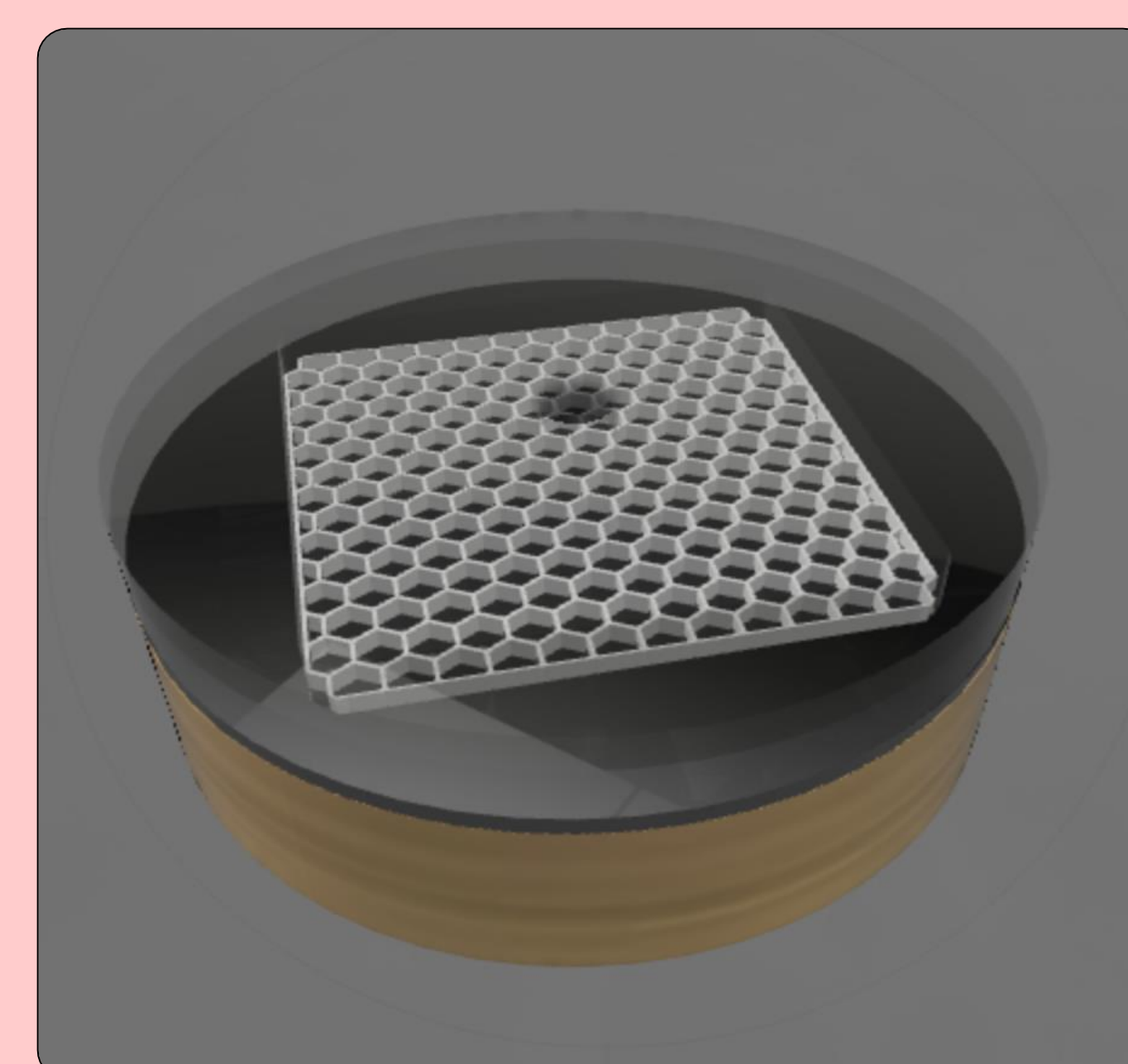
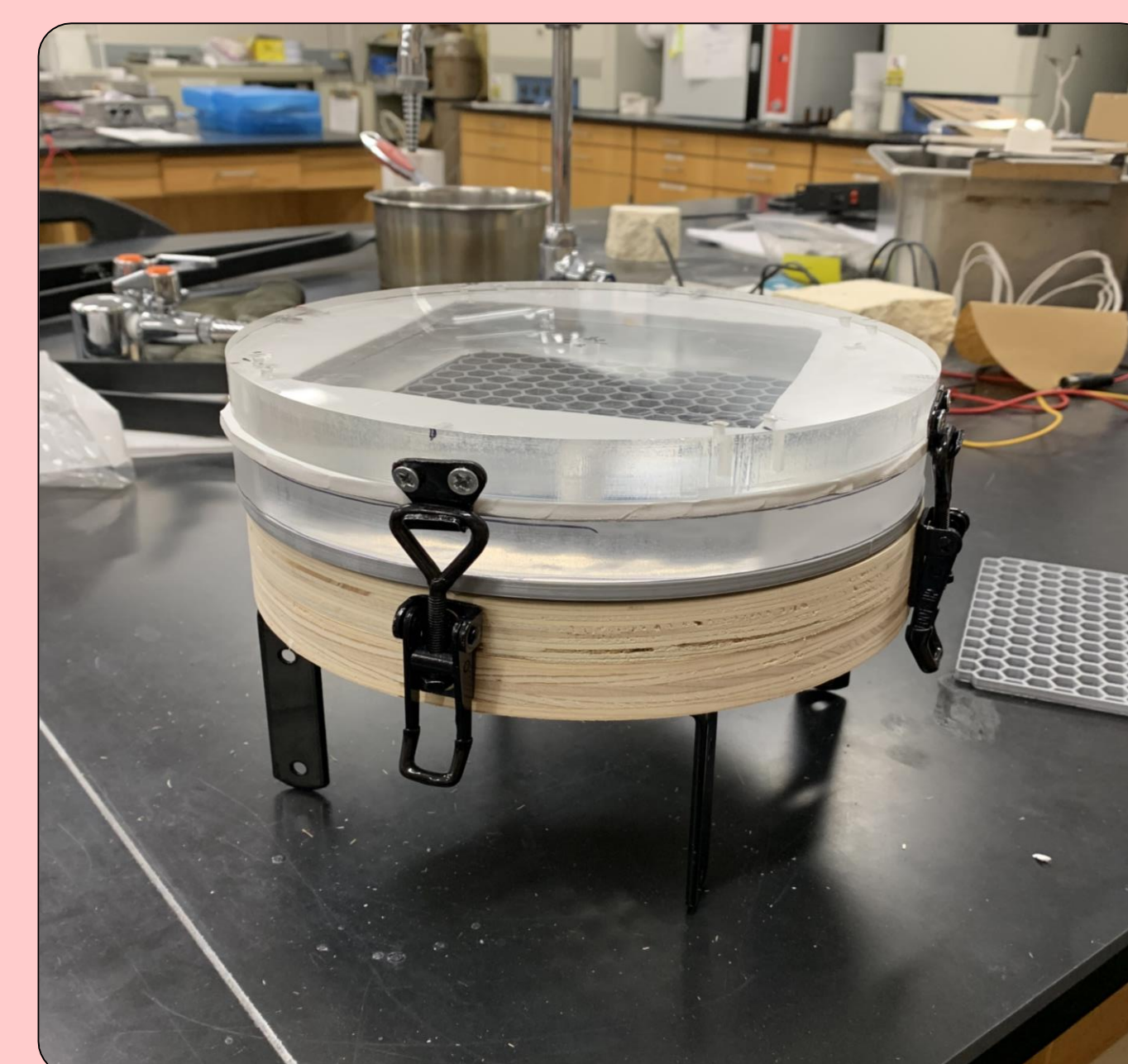
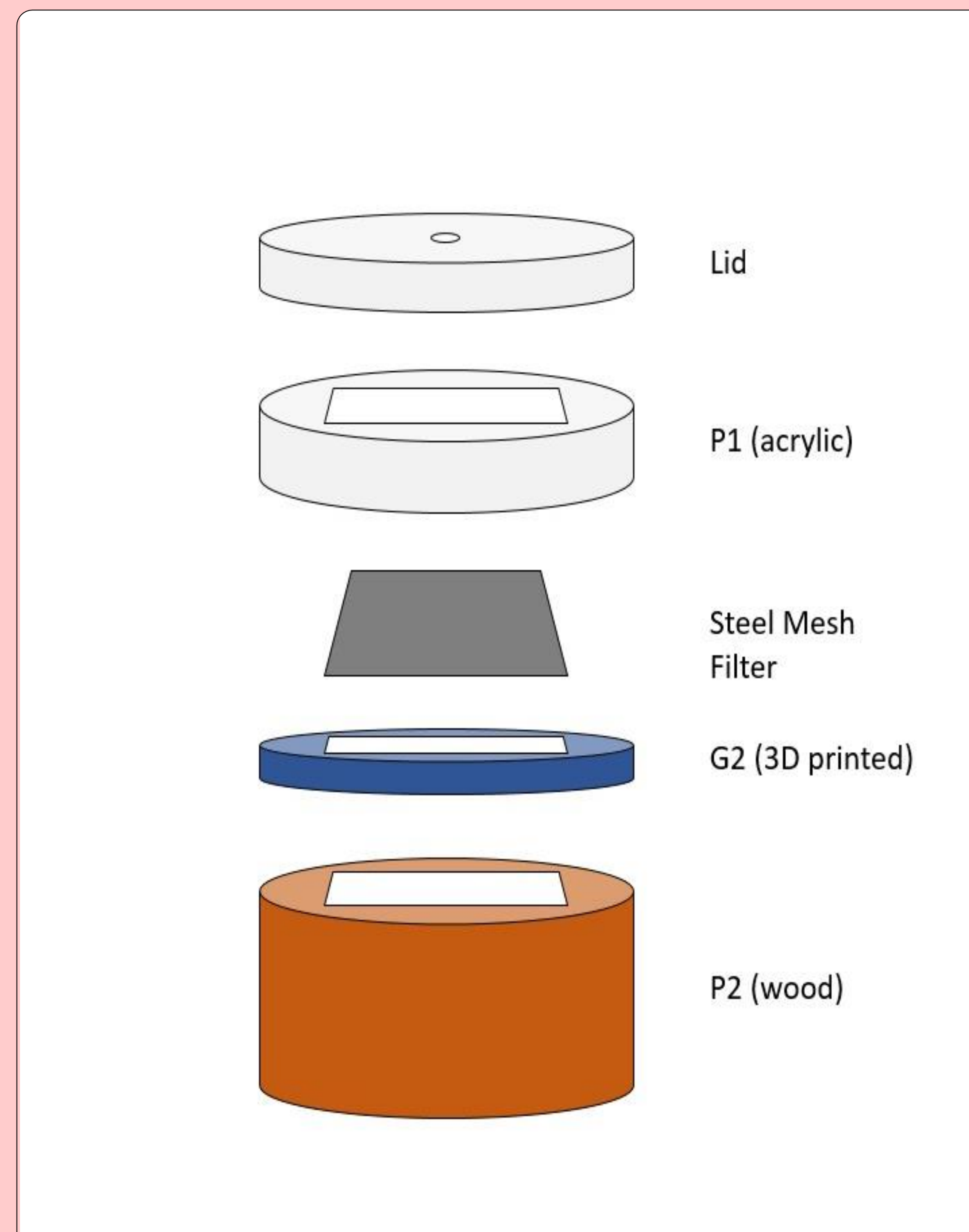
1. Design and test filtration system
2. Design and determine best microplastic release quantification method
3. Compare microplastic release for recycled and virgin material fabrics



Microscopy



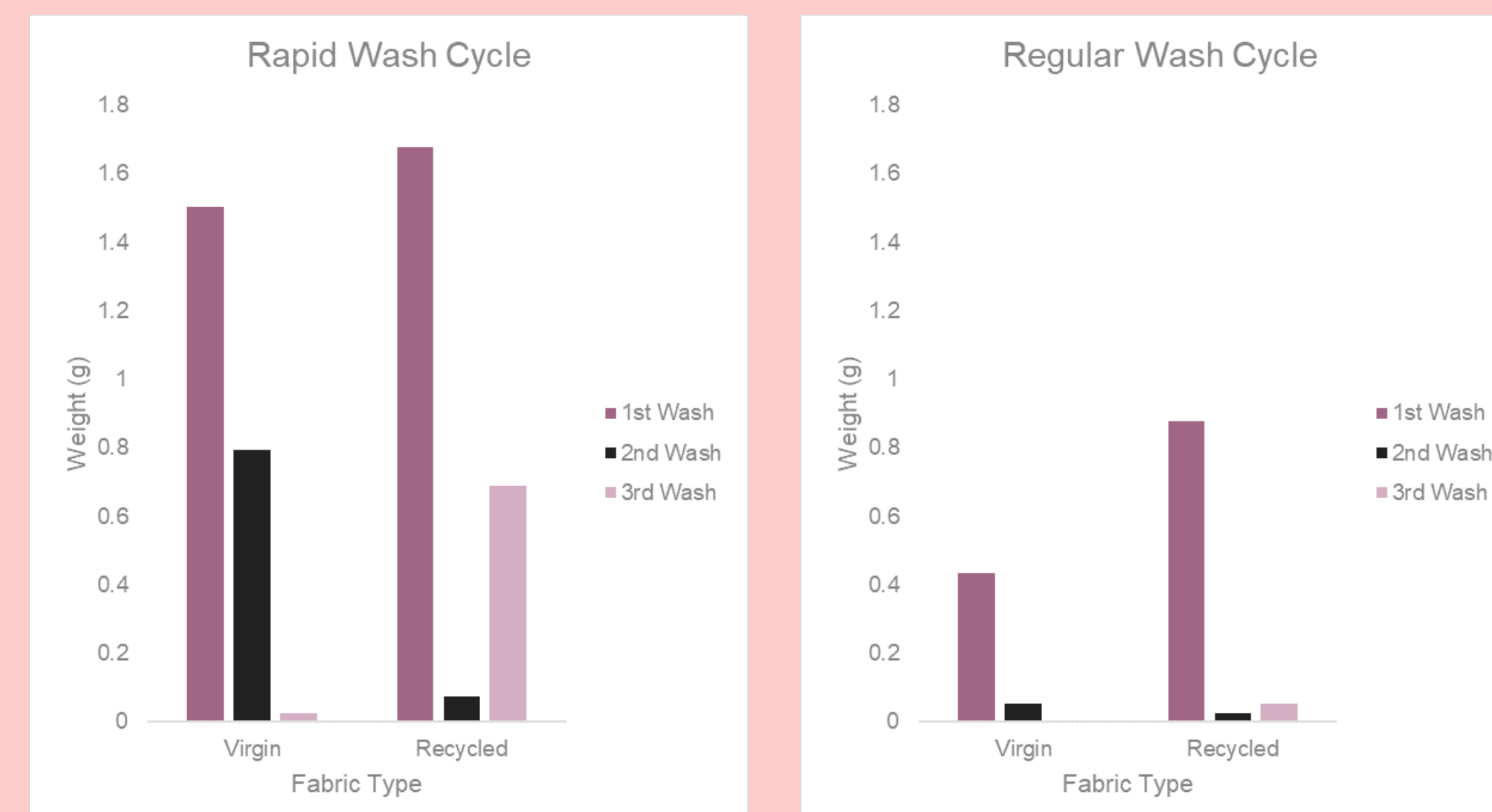
Filter System Design



Top: Final filter system prototype
Bottom: 3D model of system

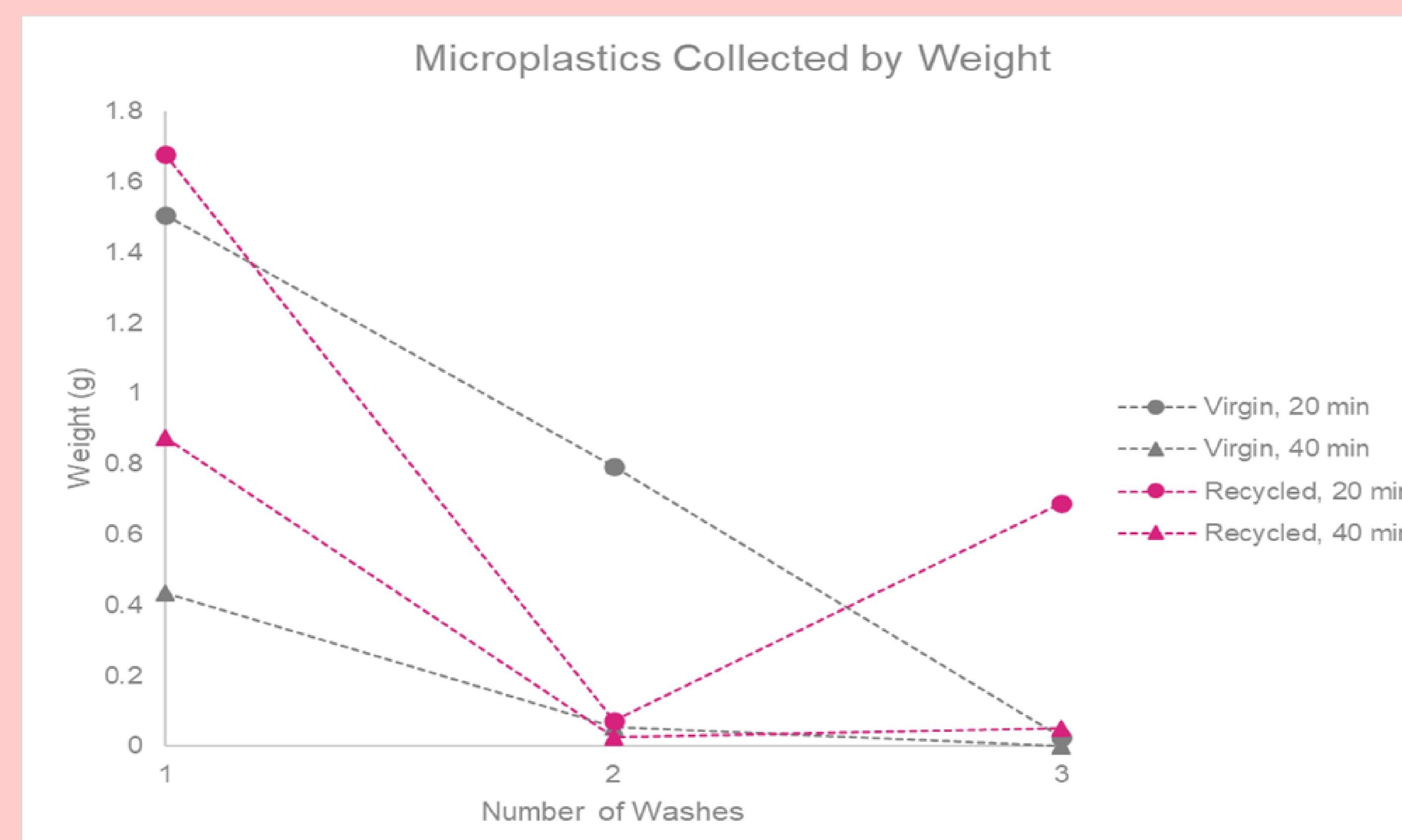
Breakdown of system design

Microplastic Release Quantification



Left: Comparison of rapid and regular wash cycle (20-minute vs. 40-minute cycle, rapid involves greater agitation)

Below: Release over 3 washes.



Conclusions & Future Work

- 1st wash and rapid wash cycle produce largest amount of microplastics regardless of fabric
- Recycled fabrics may produce more microplastics
- Edges of fabric contributed the most to microfiber release
- Most consistent method of quantification was comparing weight of filter before and after collection
- Other quantification methods poor for characteristics of fibers
- Future work: test more washing parameters (i.e. detergent), alternative sample finishing techniques, other quantification methods

Special thanks to Dr. Orla Wilson and Lauren Choi for their guidance with this project!

[1] Filella, M. (2015). Questions of size and numbers in environmental research on microplastics: methodological and conceptual aspects. *Environmental Chemistry*, 12(5), 527–538. <https://doi.org/10.1071/EN15012>

[2] Boucher, J., & Friot, D. (2017). Primary microplastics in the oceans. *IUCN*. <https://doi.org/10.2305/IUCN.CH.2017.01.en>