

Melt filtration of polymers

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One of the major problems in plastics recycling are contaminations of the material, due to colour or unwanted materials, like labels or wooden splinters from pallets. Pre-processing steps like washing, milling, grinding and sorting improve the materials quality, but there are still at least some contaminants left. To further improve the materials quality, compounding or re-melting are common steps to remove contaminants, reduce the size of the flakes and process plastics into granulate which is easier to convert than flakes (1) (2).

The aim of this work was to investigate the capabilities of using melt filtration to separate contaminants from plastics, in this case polypropylene (PP). As model substances, different size glass beads, wood particles, PET powder and zeolite were used. These materials were added as a dry-blend as much as 1% to the PP and then filtered by processing the mix with a Haake Rheocord 19 mm single-screw extruder at 210 °C and 20 rpm, equipped with a melt filtration setup where a filter with 100 µm nominal size was inserted. The mass temperature and the pressure before and after the sieve were recorded. After some extrusion time, the experiments were stopped and the machine cooled down to pull the screw, to see the remaining particles in the sieve and also in the screw.

We found, that it is possible to filter the different materials, but the efficiency depends on the size and elasticity of the contamination. While the filtration worked well to remove wood particles, the PET powder was less retained by the filter. Also, for efficient filtration the amount of contaminants as well as a possibility to renew the filter surface will be imperative for real life application.

1. **Kim Ragaert, Laurens Delva.** Mechanical and chemical recycling of solid plastic waste. *Waste Management*. 2017.

2.. European Commission - Press Release Database. http://europa.eu/rapid/press-release_IP-18-3846_de.htm. [Online] 22. Mai 2018. http://europa.eu/rapid/press-release_IP-18-3846_de.htm.