



# Simplified Recycling of Multicomponent Polymer Products

Technology No. 2019-233

**IP Status:** PCT Patent Application Filed; **Application #:** PCT/US2020/026208

## Increased compatibilization of PET and PE

This technology is a new multiblock copolymer compatibilizer that improves the recyclability of mixed plastic waste streams such as PET-PE (poly(ethylene terephthalate) - polyethylene). New methods are used to synthesize novel PET-PE multiblock copolymers that exhibit compatibility and mechanical strength in polyester/polyolefin multilayer films and blends. The method couples oligomers of poly(ethylene terephthalate) (PET) and polyethylene (PE). The materials enable recyclability of PET/PE products as blends. In addition, the new multiblock copolymer can be used as a tie-layer adhesive between polyolefin and polyester layers of a multilayer film.

## Increases recyclability of multicomponent polymer products

Polyolefins and polyesters such as polyethylene (PE) and poly(ethylene terephthalate) (PET) are usually combined to produce food or other packaging. However, their pure components cannot be easily or economically physically separated, so the multicomponent products are generally not recycled. Polyesters and polyolefins exhibit interfacial properties that result in poor general compatibility and poor adhesion. This technology works effectively as a compatibilizer for PET-PE polymer blends and enables use of ordinarily unusable blends to be formed into practical materials. These multiblock copolymers significantly improve recyclability of packaging materials by making it possible to recycle multicomponent products by direct melt blending.

## Phase of Development

- Proof of Concept. Demonstrated on laboratory scale.

## Benefits

- Stronger polyester/polyolefin interlayer adhesion
- Enables use of ordinarily unusable blends to be formed into practical materials
- Enables recycling of multicomponent polymer blends

## Features

- PET-PE multiblock copolymers
- Adhere to both a polyolefin layer and a polyester layer of a multilayer film
- Improved PE/PET film adhesion, mechanical strength and compatibility in PET/PE multilayer films and blends
- Recycle previously inseparable multicomponent products by direct melt blending

## Applications

- Recycling multicomponent polymers
- Tie-layer adhesive in multilayer films

## Researchers

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### Interested in Licensing?

The University relies on industry partners to further develop and ultimately commercialize this technology. The license is for the sale, manufacture or use of products claimed by the patents. Please contact us to share your business needs and licensing and technical interests in this technology.

## References

Keiichiro Nomura, Xiayu Peng, Hanim Kim, Kailong Jin, Hee Joong Kim, Abigail F. Bratton, Christopher R. Bond, Amelia E. Broman, Kevin M. Miller, and Christopher J. Ellison, <https://pubs.acs.org/doi/10.1021/acsami.9b20242#>, <https://pubs.acs.org/doi/10.1021/acsami.9b20242#>

Xiayu Peng, Youngsu Shin, Aristotle J. Zervoudakis, Keiichiro Nomura, Katelyn M. Lindenmeyer, Kevin M. Miller, Christopher J. Ellison, <https://doi.org/10.1002/pol.20230404>,

<https://onlinelibrary.wiley.com/doi/10.1002/pol.20230404>

<https://license.umn.edu/product/simplified-recycling-of-multicomponent-polymer-products>