Private Company

Conversion of recycled polyethylene into wax

Background

We are a company focused on sustainability and innovation in packaging, with ongoing efforts to explore new ways to valorize recycled materials. High-Density Polyethylene (HDPE) is widely used in packaging and consumer goods, but mechanical recycling often results in downcycled products with limited utility. One promising approach to increase the value of recycled HDPE is to convert post-consumer resin (PCR) into waxes. This transformation involves breaking long polymer chains into shorter ones, producing waxes suitable for applications like adhesives, coatings, and cosmetics. However, this conversion presents several challenges. Post-consumer feedstocks vary widely in composition and may contain additives or contaminants that affect both the efficiency and quality of wax production. Traditional techniques such as pyrolysis require high energy input and typically yield mixed outputs (e.g., gases, oils, and waxes) making selectivity difficult. High-purity waxes may also require extra purification, raising production costs. Despite these barriers, recent advancements offer potential for more efficient, selective, and sustainable methods. In alignment with our ongoing commitment to sustainability and the circular economy, we aim to create valuable products from recycled materials by collaborating with subject matter experts to expedite the development and commercialization of this innovative process.

What we're looking for

We are looking for partners with expertise in polymer processing, catalytic reactions, and material refinement to collaborate on the development of an efficient process for converting HDPE PCR into wax.
The ideal partner will have experience in polymer and material science, extrusion, catalytic and refining processes, along with access to suitable facilities for testing and scaling up the process.

Solutions of interest include:

- Catalyst development or selection for effective polymer chain breakdown from HDPE-PCR to wax
- Solvent-assisted conversion of HDPE-PCR into waxes
- Reactor setup optimization for HDPE-PCR processing to wax
- Innovation in the process of converting HDPE PCR to wax products
- Techniques for controlling reaction conditions (temperature, pressure, time) to maximize wax yield
- Wax recovery and refining methods to meet quality standards

Our must-have requirements are:

- Enables conversion of HDPE PCR into wax with minimal by-products
- Demonstrates potential for scalable, commercial production
- Demonstrates environmental responsibility and safety suitable for non-food applications

Our nice-to-have's are:

- Access to lab facilities for evaluating HDPE-PCR feedstock and wax outputs
- Ability to adjust wax properties to meet specific market needs
- Cost-effective catalyst solutions and catalyst recovery methods
- Techniques that enhance the energy efficiency of the process

What's out of scope:

- Non-recyclable or non-sustainable material solutions
- Processes that require completely new manufacturing infrastructure
- Processes introducing heavy metals during the conversion process

Acceptable technology readiness levels (TRL): Levels 3-9

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you

Eligible partnership models:

- Sponsored research
- Co-development
- Supply/purchase
- Licensing

Benefits:

Sponsored Research

Up to $100,000. Final funding levels are flexible and will be evaluated based on the merit, scope, and potential impact of individual proposals.

Facilities and Services

Access to an existing facility for scale-up testing and development.

Networking

Potential for long-term collaboration on sustainable product lines.

Please contact the University of South Florida Technology Transfer office representative for submission – Karla Schramm at kschramm@usf.edu