

**Scalable High Shear Catalyzed Depolymerization of Multilayer Plastic Packaging** – University of Massachusetts-Lowell, Michigan State, Unilever, American Chemistry Council, National Renewable Energy Laboratory

Node Alignment: Recycling & Recovery

Project Type: Exploratory

- The packaging industry is increasingly turning to flexible, multilayer film for barrier packaging of foods and consumer products. Layers of various polymer materials (PET, PP, PE, PP, EVOH, PA, Nylon) may be combined sometimes with paper and aluminum foil to construct highly functional, lightweight packaging that helps conserve energy and reduce greenhouse gas emissions compared to heavier, bulkier packaging.
- However, the films are inherently less recyclable than single layer films (USA recycling rate for single layer films is 13.5%, but zero for multilayer). Recycling technologies currently produce primarily nonpackaging grades or low-percentage additives for rigid packaging.
- The technical barriers to recycling multilayer film include: 1) the challenge of segregating low bulk density films using existing processing equipment, 2) difficulty in separating the laminated films into separate streams, and 3) lack of market for heterogeneous blends with altered properties.
- REMADE Technical Performance Metrics (TPMs) Being Addressed:
  - 10x reduction in primary material feedstock and 20% reduction in associated GHG.
  - Enable cross-industry reuse of recycled feedstock
- Technology/Knowledge Gaps Being Addressed:
  - Lack of cost-effective and energy efficient-conversion technologies limit subsequent reprocessing of waste cellulose, polymers, and fibers.
  - The effect of beneficiation steps or particle size on acid-base demineralization of carbon black is not well known.