

Applicant name: UHV Technologies, Inc.

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Project Title: Advanced Sensing for Characterization and Sorting of Non-Recyclable Plastics Using Sensor Fusion with Artificial Intelligence

Objectives: The first objective is to develop an instrument which can quantify individual pieces of plastic with multiple sensors and assign a unique fingerprint containing organic and inorganic data to each piece. The second objective is to create a novel classification system for polymer and multilayer polymers in this stream with deep learning and artificial intelligence algorithms. The third objective is to develop three different products with catalytic pyrolysis to determine which of the novel sorted fractions are most viable for the creation of products. The fourth objective is to perform end to end TEA and LCA to ensure economic viability of the sorting technology.

Description: The project goal is to advance state-of-the-art plastic sorting capabilities by employing cutting edge technologies such as sensor fusion and artificial intelligence based deep learning algorithms. The proposed technology will develop advanced and techno-economically viable sorting and preprocessing methods tailored to MSW. To this end, an existing stream of non-recyclable MSW plastics such as #3 - #7 which is currently produced at existing MRFs from NIR sorters will be investigated to divert from disposal for conversion to fuels, and products.

Methods: Deep Learning neural networks will be developed to perform chemical based classification of components found in the non-recyclable plastic waste stream. An experimental apparatus will be developed which uses air nozzle jets to perform sorting, fractionation, and decontamination of this waste stream. Pyrolysis testing will be used to evaluate the viability of the novel fractions to produce new products.

Potential Impact: Novel fractions from this waste stream have the potential to become a valuable feedstock for the production of gases and fuels. These 1200-pound bales created from this plastic waste stream sell for \$6-\$10 in the current open market conditions. This sorting technology potentially enables a new low-cost feedstock for the creation of new products.

Major Participants: UHV Technologies, Inc., Idaho National Laboratories, The University of Illinois at Urbana-Champaign, Palm Beach Solid Waste Authority