Applicant Name: Technology Holding LLC
Control Number: 1926-1529

**Summary for Public Release**

**Project Title**: Novel Method for Biomass Conversion to Renewable Jet Fuel Blend

**Applicant Name**: Technology Holding LLC

**PI: Mukund Karanjikar**

**Major Participants**

Prof. Paul Chirik (Princeton University), Dr. Benjamin Harvey (NAWCWD), Prof. Sabrina Spatari (Drexel U)

**Project Objectives**

The overall objective of the proposed innovation is to demonstrate techno-economic feasibility of an integrated process to produce drop-in jet fuel blend and isoprene as a co-product from biomass hydrolysate such that private funding can be obtained after the initial governmental funded period. The technology will be matured from TRL3 to TRL5. The various sub-objectives are:

1. Optimize isoprene production using biomass hydrolysate
2. Scale up isoprene production process to 100 L fermenter using biomass hydrolysate and cheap minimal media
3. Optimize the catalytic conversion of isoprene to dimethylcyclooctane and diisopropylcyclobutane (drop-in jet fuel blend) to produce higher specific energy jet fuel
4. Deliver 100 gallons of fuel blend for characterization to DOE
5. Develop overall process system model and GHG assessment model
6. Develop techno-economic feasibility model

**Abstract**

Numerous renewable energy strategies are currently being investigated including solar, wind, and alcohols from biomass. While many of these alternatives have potential for reducing our dependency on fossil fuels for electricity and short haul ground transportation; long haul transportation, both air and ground, will continue to depend on infrastructure compatible hydrocarbon fuels derived from petroleum due to energy density. The proposed innovation is a novel method for production of renewable jet fuel blend. The innovation utilizes an engineered *E. coli* to convert biomass sugars to a diolefin at high titers. The produced diolefin is then selectively dimerized to produce high energy density (HED) dimer that can be blended with jet fuel upon simple hydrogenation. We will produce 100 gallon of jet fuel blend and perform detailed characterization according to ASTM D4054 and D7566. Techno-economic feasibility and life cycle assessment of the overall process will be determined. The proposed fuels will transform the art of fuels manufacturing beyond traditional petroleum based fuels. The proposed innovation will have high impact on a jet fuel markets for DOD as well as civilian application. Upon successful commercialization, the innovation will help reduce greenhouse gases emissions, increase overall energy efficiency and create domestic jobs.