Microscale combustion calorimeter (MCC) is an efficient instrument to evaluate flammability of materials from only milligram sized samples. MCC uses milligram-sized samples to study the pyrolysis of materials under controlled environment (atmosphere/heating rate/temperature range). Though the decomposition of the products, the heat release rate Q(t)(W/g) is calculated based on the oxygen consumption theory as a function of time. Due to the high cost of many standardized flame retardant tests, MCC can provide significant design flexibility for flame retardant material formations and rapid prototyping options. However, the correlations of flame retardant testing results are often inconsistency with specific parameters extracted from MCC data.

In this project, we plan to analyze MCC data from 22 different kinds of adhesive materials. In each kind of adhesive materials, there are 2-3 different formulations. The total sample number is 58. Along with the MCC data, the dataset provided also contains information on pass/fail in accordance with FAR25.853 (a) vertical burn flame retardant test standard. The goal of this project is to establish a correlation between MCC data with actual flame retardant testing results. There are five useful parameters can be extracted from MCC data including heat release capacity, total heat release, ignition temperature, pyrolysis residue, and fire growth capacity. These five parameters can be used as dataset features for modeling.