Public Abstract
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Flammability Characterization of Fat and Oil Derived Phase Change Materials
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Phase change materials are a quickly growing commodity in a world which now places a premium on energy conservation, and renewable energy sources. The implementation of phase change materials into several world markets can lead to reduced energy costs, reduced emissions from energy sources, and increased opportunity to take advantage of alternative energy sources, such as solar and wind power. Understanding the flammability characteristics of phase change materials will increase the ability to adequately introduce these materials into these markets, which may be very sensitive to flammability concerns, such as building construction. This thesis is a discussion of a project designed to determine flammability relationships for many fat and oil derived phase change materials, and to compare these to the current market's dominant phase change material, paraffins.

The flammability characteristics of the phase change materials were evaluated by burn tests similar to ASTM standards. Flash points were measured and the flammability characteristics were correlated with the flash points, boiling points, and molecular weight. The flash point of each material could be directly linked to both the materials boiling point and molecular weight; both have a positive linear relationship. Based on these results, it was concluded that phase change materials derived from natural fats and oils have a lower propensity to burn than petroleum derived paraffins. For future implementations into markets in which flammability is very important it would be wise to select these natural phase change materials for many of these applications.