Public Abstract
First Name: John
Middle Name: J
Last Name: Hahn
Degree: PhD
Academic Program: Chemical Engineering
Adviser's First Name: William
Adviser's Last Name: Jacoby
Graduation Term: Fall
Graduation Year: 2006

Title: HYDROGEN PRODUCTION FROM BIOMASS

Biomass energy encompasses a broad category of energy derived from plants and animals as well as the residual materials from each. Hydrogen gas is an effective energy carrier which burns cleanly producing water as the only product. Hydrogen produced from a renewable source such as biomass provides a domestically available, CO_2 neutral, non-polluting form of energy.

The goal of the work presented in this thesis was to develop two different methods to produce hydrogen gas using biomass as a renewable energy source. The first method was to produce hydrogen using photosynthetic algae. *C. reinhardtii* has been shown to produce hydrogen using light as an energy source. The objective of this work was to increase hydrogen production by a) manipulating process variables such as cell concentration, light intensity, and reactor design and b) immobilizing the algal cells to increase photosynthetic efficiency and address production limitations.

The second method of hydrogen production explored was gasification of biomass using supercritical water (SCW). A continuous SCW reactor was constructed to increase capacity and understand the optimum conditions necessary to gasify model compounds. Increasing the capacity of SCW reactors and understanding how basic components of biomass react may lead to further development of this technology.