

Biomass pyrolysis and gasification integrated process for bio-fuel production: Process modeling and analysis

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Concerns about energy security and the environment caused by fossil fuel usage stimulate the development of renewable energy resources and technologies. In this study, the biomass pyrolysis and gasification integrated process is investigated. Rice straw with low moisture content is considered biomass feedstock for bio-fuel production, i.e., charcoal, synthesis gas and bio-oil. Model of the integrated process is developed in Aspen custom modeler. Effect of pyrolysis temperature on product distribution and overall energy consumption) is analyzed. The design of the biomass process is carried out using the pinch analysis and the economic analysis is performed to evaluate the economic feasibility of the proposed process. In addition, CO₂ capture technology is proposed to enhance the performance of the pyrolysis-gasification process.

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Research Interest: Dr. Amornchai focuses his research on the area of process systems engineering dealing with (1) modeling and simulation for process analysis, improvement and design, (2) process optimization and (3) development and design of a process control system. Special emphasis is placed on research topics related to fuel cells, hydrogen energy, renewable energy, energy storage, and biorefinery. His research aims to study, develop and design the production process of electrical energy and alternative fuels with optimal overall efficiency and environmental friendliness.

