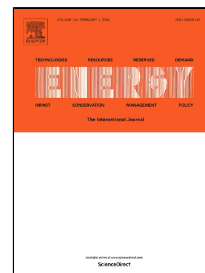


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Study on Co-Liquefaction of *Spirulina* and *Spartina alterniflora* in Ethanol-Water Co-Solvent for Bio-oil

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Abstract

Spartina alterniflora of Lignocellulosic biomass is an invasive plant that rapidly grows in China which threatens the local ecological balance. The possibility of co-liquefaction (CL) of *Spartina alterniflora* with a low-lipid containing microalgae *Spirulina* in ethanol-water co-solvent (EWCS) for bio-oil production was investigated. The results show that bio-oil productivity was increased to 45.63 wt.% with a higher heating value (HHV) of 34 MJ/Kg, just because of the positive synergistic effect from CL process. In addition, the synergistic effect of bio-oil production has different performance at different temperatures, ethanol volume fraction or raw material blending ratio. Bio-oils were analyzed by GC-MS and FT-IR, which showed CL of mixed raw material resulted in a significant increase of hexadecanoic acid ethyl ester compared to liquefaction of pure *Spirulina* or *Spartina alterniflora*, indicated a good quality of bio-oil produced.

Keywords: *Spartina alterniflora*; *Spirulina*; ethanol-water co-solvent; co-liquefaction; bio-oil.

1 Introduction

Diminishing of fossil fuels and the environmental issues from consumption of fossil resources lead to intensive work on finding a better alternative fuel[1-3]. Bio-oil seemed to be a good choice for its sustainability from conversion of renewable biomass[4, 5]. Feasibility of bio-oil as an alternative fuel has already been confirmed in literatures[5, 6]. Microalgae was considered as the ideal bio-resource for the “third-generation bio-fuel” production due to its fast breeding speed, high

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