energy&fuels

JANUARY 2014
VOLUME 28 ISSUE 1
ENFUEM 28(1) 1−734 (2014)
ISSN 0887-0624
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4th (2013) Sino-Australian Symposium on Advanced Coal and Biomass Utilisation Technologies

This year (2013) marks the fourth occasion of this series of Sino-Australian Symposia, jointly organized by Huazhong University of Science and Technology (HUST) in China and Curtin University (Curtin) in Australia. As an important platform for research exchange in the field of coal and biomass utilization among Australian, Chinese, and other international researchers, the first symposium,[1] second symposium,[2] and third symposium[3] were held in Wuhan, China, in 2006, 2009, and 2011, respectively. The fourth symposium, also held in Wuhan from December 9 to 11, 2013, has received a large number of invited contributions from over 10 countries and regions. All submissions have been subjected to the journal's regular and rigorous peer-review process. The high-quality papers that have survived the process are published in this special section, with brief summaries given below.

Topic Reviews. Two review papers are included. Hayashi et al.[4] (10.1021/ef401617k) discuss the essential considerations in low-temperature gasification of low-rank solid fuels with maximized performance and summarize several gasification reactor configurations for realizing these. Sun and Wang[5] (10.1021/ef401426x) offer an overview of the recent advances in synthesizing nanocarbon-based photocatalysts for converting CO_2 to hydrocarbon fuels.

Chemical Reactions in Fuel Utilization. There are four papers on this topic. Horton and Klein[6] (10.1021/ef401582c) propose a method for estimating reaction rate constants essential to developing molecular-level kinetic models of coal and biomass hydroprocessing. Lane et al.[7] (10.1021/ef4014983) report the reaction characteristics of both micro- and macroalgae during combustion under practical conditions. Zhang et al.[8] (10.1021/ef401458y) discuss the reaction mechanism governing the coke-depositing behavior on ZSM-5 during the catalytic pyrolysis of furan. Liu et al.[9] (10.1021/ef4021153) demonstrate *in situ* char from coal pyrolysis (without cooling) being more active and effective than *ex situ* char (after cooling) in tar elimination for syngas cleaning.

Hydrothermal Processing. Valdez et al.[10] (10.1021/ef401506u) prove that high yields of biocrude can be produced from the hydrothermal liquefaction of bacteria and yeast. Kudo et al.[11] (10.1021/ef401557w) propose to produce substitute natural gas directly from lignin in aqueous alkaline media via catalytic hydrothermal reforming. Zhao et al.[12] (10.1021/ef401439k) explore the fundamental K-catalyzed supercritical-water (SCW) gasification of formaldehyde.

Alternative Fuels. Gong et al.[13] (10.1021/ef401500z) report the yields and characteristics of gas, biochar, and bio-oil from the pyrolysis of low-lipid microalgae. Kan et al.[14] (10.1021/ef401568s) compare the pyrolysis performance among various algae (freshwater, marine, micro-, and macro-algae) with a focus on the fuel properties of biochar, bio-oil, and biogas. Wang et al.[15] (10.1021/ef4012615) propose a novel cracking technology based on bio-oil molecular distillation for producing biogasoline with minimized coke formation.

Oxy-fuel. This special section publishes four papers on oxy-fuel technology. Spörl et al.[16] (10.1021/ef4014604) evaluate key process parameters that influence the Hg emissions of an oxy-fuel combustion process using a 20 kW once-through combustion rig. Chen et al.[17] (10.1021/ef401527g) compare the evolution of particle size during pulverized coal combustion in O_2/CO_2 and O_2/N_2 atmospheres. Zhan et al.[18] (10.1021/ef4014899) report the development of an innovative temperature-controlled ash deposition probe system for oxy-coal combustion. Li et al.[19] (10.1021/ef401499g) present a mathematical model of oxy-fuel combustion in a refractory-lined down-flame furnace.

Chemical Looping. There are four papers on chemical looping technology. The two papers by Song et al.[20,21] (10.1021/ef401485p and 10.1021/ef401487x) report the development and kinetic analysis of CuO/SiO_2 oxygen carriers that are potentially long-term stable for chemical looping air separation. Huang et al.[22] (10.1021/ef401528k) present a fundamental study into chemical looping gasification of biochar using NiO-modified iron ore as an oxygen carrier. Zhang et al.[23] (10.1021/ef4015718) introduce a novel method combining chemical looping combustion and Hg continuous emissions monitor for measuring the Hg concentration in fuel gas.

Ash-Related Issues. Wu et al.[24] (10.1021/ef4015108) present a detailed chemical kinetic model for KCl sulfation in a combustion atmosphere, considering various sulfate additives. Wang et al.[25] (10.1021/ef401521c) evaluate the effects of sewage sludge, marble sludge, and clay sludge as additives in abating sintering of biomass ash. Li et al.[26] (10.1021/ef401530a) investigate the dynamic ash deposition process during the combustion of various biomass fuels in a 25 kW one-dimensional down-fired furnace.

Pyrolysis. In this special section, Kan et al.[27] (10.1021/ef401511u) report the distribution and properties of products from the catalytic pyrolysis of coffee grounds using NiCu-impregnated catalysts. Zhang et al.[28] (10.1021/ef401546n) discuss a new fixed-bed coal pyrolysis reactor with designed internals for enhanced performance. Yu et al.[29] (10.1021/ef401483u) show that impregnation of NaCl or $MgCl_2$ can significantly influence the reaction intermediate formation and characteristics during cellulose fast pyrolysis. Wang et al.[30] (10.1021/ef401424p) report the effects of various experimental parameters on the yield and properties of coal microwave pyrolysis products.

Gasification/Char Reactivity. There are four papers on this topic. Wang et al.[31] (10.1021/ef401281h) explore the relationships between the char structure and intrinsic reactivity using deployed Raman spectroscopy. Yang et al.[32] (10.1021/ef401497a) report the gasification behavior of an upgraded

Special Issue: 4th (2013) Sino-Australian Symposium on Advanced Coal and Biomass Utilisation Technologies

Published: November 25, 2013