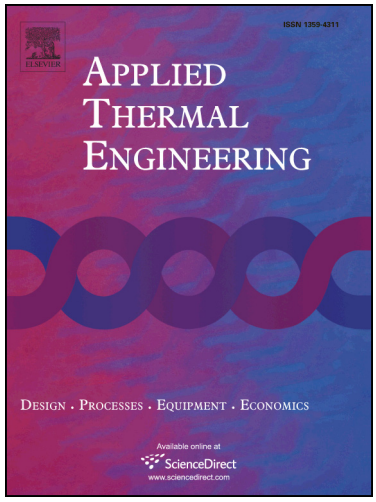

Ethanol adsorption uptake and kinetics onto waste palm trunk and mangrove based activated carbons

Animesh Pal, Hyun-Sig Kil, Sourav Mitra, Kyaw Thu, Bidyut Baran Saha, Seong-Ho Yoon, Jin Miyawaki, Takahiko Miyazaki, Shigeru Koyama

PII: S1359-4311(17)31968-3
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.04.099
Reference: ATE 10248

To appear in: *Applied Thermal Engineering*

Received Date: 24 March 2017
Revised Date: 21 April 2017
Accepted Date: 22 April 2017

Please cite this article as: A. Pal, H-S. Kil, S. Mitra, K. Thu, B. Baran Saha, S-H. Yoon, J. Miyawaki, T. Miyazaki, S. Koyama, Ethanol adsorption uptake and kinetics onto waste palm trunk and mangrove based activated carbons, *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.04.099

Ethanol adsorption uptake and kinetics onto waste palm trunk and mangrove based activated carbons

Animesh Pal [1,2,3], Hyun-Sig Kil [4], Sourav Mitra [2], Kyaw Thu [1,2,3], Bidyut Baran Saha [1,2,5,*], Seong-Ho Yoon [3,6], Jin Miyawaki [3,6], Takahiko Miyazaki[2,3], Shigeru Koyama[2,3]

[1]*Kyushu University Program for Leading Graduate School, Green Asia Education Center, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Kasuga-koen 6-1, Kasuga-shi, Fukuoka 816-8580, Japan*

[2]*International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, 744 Motooka, Nishi-ku, Fukuoka 819-0395, Japan*

[3]*Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Kasuga-koen 6-1, Kasuga-shi, Fukuoka 816-8580, Japan*

[4]*Carbon Convergence Materials Research Center, Korea Institute of Science and Technology, 92 Chudong-ro, Bongdong-eup, Wanju-gun, Jeonbuk 55324, Republic of Korea*

[5]*Mechanical Engineering Department, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka 819-0395, Japan*

[6]*Institute for Materials Chemistry and Engineering, Kyushu University, Kasuga-koen 6-1, Kasuga-shi, Fukuoka 816-8580, Japan*

[*]Corresponding Author's email: saha.baran.bidyut.213@m.kyushu-u.ac.jp

Abstract

Equilibrium adsorption uptake and kinetics of ethanol onto highly porous activated carbons (ACs) derived from two types of biomass namely waste palm trunk (WPT) and mangrove (M) have been experimentally measured at adsorption temperatures ranging from 30 to 70°C for various evaporation pressures. A magnetic suspension adsorption measurement unit has been used for the experimental measurements. Four well-known adsorption isotherm models have been employed to fit the experimental data whilst two classical adsorption kinetics models i.e. Linear driving force (LDF) model and Fickian diffusion (FD) model are used to predict the experimental kinetics data. Among the four isotherm models Dubinin Astakhov (D-A), and Tóth equations agree well with the experimental uptake data for both ACs. The diffusion time constants are calculated at each adsorption temperature for WPT-AC/ethanol and M-AC/ethanol pairs. Moreover, activation energy and pre-exponential constant have been determined from the Arrhenius equation.