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Aho, M. 1987 Pyrolysis and combustion of peat and wood as single particles and as a layer. *Journal of Analytical and Applied Pyrolysis* 11: 149-162 DOI: 10.1016/0165-2370(87)85025-8

Arce, ME; Saavedra, A; Miguez, JL; Granada, E; Cacabelos, A. 2013 Biomass fuel and combustion conditions selection in a fixed bed combustor. *Energies* 6: 5973-5989.

Bidabadi, M; Abedinejad, MS; Fereidooni, J. 2011 Modeling of the Propagation of a Reaction Front in Fixed Bed Combustion of Wood Particles. *Journal of Mechanics* 27: 453-459 DOI: 10.1017/jmech.2011.48

Branca, C; Giudicianni, P; Di Blasi, C. 2003 GC/MS characterization of liquids generated from low-temperature pyrolysis of wood. *Industrial & Engineering Chemistry Research* 42: 3190-3202. DOI: 10.1021/ie030066d

Brem, G; van Kessel, LBM. 1998 Computer simulation of waste combustion in a moving grate furnace as a tool for process optimization and operator training. 6th Annual Waste-to-Energy Conference, Miami.

Bruch, C; Peters, B; Nussbaumer, T. 2003 Modelling wood combustion under fixed bed conditions. *Fuel* 82: 729-738 DOI: 10.1016/S0016-2361(02)00296-X

Collazo, J; Porteiro, J; Patino, D; Granada, E. 2012 Numerical modeling of the combustion of densified wood under fixed-bed conditions. *Fuel* 93: 149-159 DOI: 10.1016/j.fuel.2011.09.044

Dasappa, S; Paul, PJ; Mukunda, HS; Shrinivasa, U. 1998 Wood-char gasification: experiments and analysis on single particles and packed beds. In: *Twenty-seventh symposium (international) on combustion*. The Combustion Institute; p. 1335-42.

Di Blasi, C; Signorelli, G; Portoricco, G. 1999 Countercurrent fixed-bed gasification of biomass at laboratory Scale. *Industrial & Engineering Chemistry Research* 38: 2571-2581 DOI: 10.1021/ie980753i

Dosanjh, SS; Pagni, Pj; Fernandezpello, AC. 1987 Forced cocurrent smoldering combustion. *Combustion and Flame* 68: 131-142 DOI: 10.1016/0010-2180(87)90052-6

Drew DA 1986 One-dimensional burning wave in a bed of monopropellant particles. *Combustion Science and Technology*, 47: 139-164

Fang, JB; Steward FR. 1969 Flame spread through randomly packed fuel particles. Combustion and Flame 13, 392-398

Fatehi M, Kaviany M. 1994 Adiabatic reverse combustion in a packed bed. Combustion and Flame 99: 1-17.

Fatehi, M; Kaviany, M. 1997 Role of gas-phase reaction and gas-solid thermal nonequilibrium in reverse combustion. International Journal of Heat and Mass Transfer 40: 2607-2620 DOI: 10.1016/S0017-9310(96)00282-7

Friberg, R; Blasiak, W. 2002. Measurements of mass flux and stoichiometry of conversion gas from three different wood fuels as function of volume flux of primary air in packed-bed combustion. Biomass & Bioenergy 23: 189-208 DOI: 10.1016/S0961-9534(02)00048-X 2002 Measurements of mass flux and stoichiometry of conversion gas from three different wood fuels as function of volume flux of primary air in packed-bed combustion. Biomass & Bioenergy 23: 189-208 DOI: 10.1016/S0961-9534(02)00048-X

Gilbert, P; Ryu, C; Sharifi, V; Swithenbank, J. 2009 Effect of process parameters on pelletisation of herbaceous crops. Fuel 88: 1491-1497 DOI: 10.1016/j.fuel.2009.03.015

Gomez, MA; Porteiro, J; Patino, D; Miguez, JL. 2014 CFD modelling of thermal conversion and packed bed compaction in biomass combustion. Fuel 117: 716-732 DOI: 10.1016/j.fuel.2013.08.078

Granada, E; Eguia, P; Comesana, JA; Patino, D; Porteiro, J; Saavedra, N. 2012 Experimental analysis of several biomass fuels: The effect of the devolatilization rate on packed bed combustion. Journal of Renewable and Sustainable Energy 4: 053104 DOI: 10.1063/1.4738593

Gort, R; Brouwers, JJH 2011 Theoretical analysis of the propagation of a reaction front in a packed bed. Combustion And Flame Volume: 124 Issue: 1-2 Pages: 1-13 Doi: 10.1016/S0010-2180(00)00149-8

Hallett, W; Green, B; Machula, T; Yang, Y. 2013 Packed bed combustion of non-uniformly sized char particles. Chemical Engineering Science 96: 1-9 DOI: 10.1016/j.ces.2013.02.070

Haynes, BS; Kirov, NY 1974 Nitric oxide formation during the combustion of coal. Combustion and Flame 23: 277-278

Horttanainen MVA, Saastamoinen JJ, Sarkomaa PJ. 2000 Ignition front propagation in packed beds of wood particles. IFRF Combustion Journal, www.journal.ifrf.net, Article Number 200003, ISSN 1562-479X, May 2000.

- Horttanainen, M; Saastamoinen, J; Sarkomaa, P. 2002 Operational limits of ignition front propagation against airflow in packed beds of different wood Fuels. *Energy & Fuels* 16: 676-686 DOI: 10.1021/ef010209d
- Khor, A; Ryu, C; Yang, YB; Sharifi, VN; Swithenbank, J. 2007. Straw combustion in a fixed bed combustor. *Fuel* 86: 152-160 DOI: 10.1016/j.fuel.2006.07.006 2007 Straw combustion in a fixed bed combustor. *Fuel* 86: 152-160 DOI: 10.1016/j.fuel.2006.07.006
- Klason, T; Bai, XS. 2007 Computational study of the combustion process and NO formation in a small-scale wood pellet furnace. *Fuel* 86: 1465-1474 DOI: 10.1016/j.fuel.2006.11.022
- Kolb, T; Bleckwehl, S; Gehrman, HJ; Seifert, H. 2008 Characterisation of combustion behaviour of refuse derived fuel. *Journal of the Energy Institute* 81: 1-6 DOI: 10.2179/174602208X269526
- Li, ZQ; Zhao, W; Zhao, GB; Zhang, FS; Zhu, QY. 2008 Effect of corn stalk length on combustion characteristics in a fixed bed. *Energy & Fuels* 22: 2009-2014 DOI: 10.1021/ef700755b
- Lenis, YA; Osorio, LF; Perez, JF. 2013 Fixed bed gasification of wood species with potential as energy crops in colombia: the effect of the physicochemical properties. *Energy Sources Part A-recovery Utilization and Environmental Effects* 35: 1608-1617 DOI: 10.1080/15567036.2012.704486
- Mahapatra, S; Dasappa, S. 2014 Experiments and analysis of propagation front under gasification regimes in a packed bed. *Fuel Processing Technology* 121: 83-90.
- Markovic, M; Bramer, EA; Brem, G. 2014 Experimental investigation of wood combustion in a fixed bed with hot air. *Waste Management* 34: 49-62
- Marskell, WG; Miller, JM. 1946 Mode of combustion of coal on a chain grate stoker. *Fuel in Science and Practice*, 25: 4-11, 50-62, 78-85, 109-13, 159-62.
- Mayers, MA; Landau, HG. 1940 Ignition in beds of solid fuel. *Industrial and Engineering Chemistry* 32: 563-568 DOI: 10.1021/ie50364a027
- Mehrabian, R; Shiehnejadhesar, A; Scharler, R; Obernberger, I. 2014 Multi-physics modelling of packed bed biomass combustion. *Fuel* 122: 164-178 DOI: 10.1016/j.fuel.2014.01.027
- Mikhaliyov, IO; Islamov, SR. 2009 Experimental investigation into the process of fixed-bed coal gasification with reversed air blowing. *Combustion Explosion and Shock Waves* 45: 686-691 DOI: 10.1007/s10573-009-0085-6

Perez, JF; Melgar, A; Benjumea, PN. 2012 Effect of operating and design parameters on the gasification/combustion process of waste biomass in fixed bed downdraft reactors: An experimental study. *Fuel* 96: 487-496. DOI: 10.1016/j.fuel.2012.01.064

Porteiro, J; Patino, D; Moran, J; Granada, E. 2010 Study of a fixed-bed biomass combustor: influential parameters on ignition front propagation using parametric analysis. *Energy & Fuels* 24: 3890-3897 DOI: 10.1021/ef100422y

Porteiro, J; Patino, D; Collazo, J; Granada, E; Moran, J; Miguez, JL. 2010 Experimental analysis of the ignition front propagation of several biomass fuels in a fixed-bed combustor. *Fuel* 89: 26-35 DOI: 10.1016/j.fuel.2009.01.024

Porteiro, J; Patino, D; Miguez, JL; Granada, E; Moran, J; Collazo, J. 2011 Study of the reaction front thickness in a counter-current fixed-bed combustor of a pelletised biomass. *Combustion and Flame* 159: 1296-1302 DOI: 10.1016/j.combustflame.2011.10.007

Razuan, R; Chen, Q; Zhang, X; Sharifi, V; Swithenbank, J. 2010 Pyrolysis and combustion of oil palm stone and palm kernel cake in fixed-bed reactors. *Bioresource Technology* 101: 4622-4629 DOI: 10.1016/j.biortech.2010.01.079

Rogaume, T; Auzanneau, M; Jabouille, F; Goudeau, JC; Torero, JL. 2002 The effects of different airflows on the formation of pollutants during waste incineration. *Fuel* 81 : 2277-2288 DOI: 10.1016/S0016-2361(02)00151-5

Rogers, J.E.L., Sarofim, A.F., and Howard, J.B. 1972 Effect of underfire air rate on a burning simulated refuse bed. *National Incinerator Conference [Proceedings]*. ASME, New York, pp. 135-144.

Ryan, JS; Hallett, WLH. 2002 Packed bed combustion of char particles: experiments and an ash model. *Chemical Engineering Science* 57: 3873-3882 DOI: 10.1016/S0009-2509(02)00235-X

Ryu, C; Yang, YB; Nasserzadeh, V; Swithenbank, J. 2004 Thermal reaction modeling of a large municipal solid waste incinerator. *Combustion Science and Technology* 176: 1891-1907 DOI: 10.1080/00102200490504526

Ryu, C; Yang, YB; Khor, A; Yates, NE; Sharifi, VN; Swithenbank, J. 2006 Effect of fuel properties on biomass combustion: Part I. Experiments - fuel type, equivalence ratio and particle size. *Fuel* 85: 1039-1046 DOI: 10.1016/j.fuel.2005.09.019

Ryu, C; Phan, AN; Yang, YB; Sharifi, VN; Swithenbank, J. 2007 Ignition and burning rates of segregated waste combustion in packed beds. *Waste Management* 27: 802-810 DOI: 10.1016/j.wasman.2006.04.013

Saastamoinen, JJ; Taipale, R; Horttanainen, M; Sarkomaa, P. 2000 Propagation of the ignition front in beds of wood particles. *Combustion and Flame* 123: 214-226 DOI: 10.1016/S0010-2180(00)00144-9

Saastamoinen, JJ; Horttanainen, M; Sarkomaa, P. 2001 Ignition wave propagation and release of volatiles in beds of wood particles. *Combustion Science and Technology* 165: 41-60 DOI: 10.1080/00102200108935825

Saravanakumar, A; Haridasan, TM; Reed, TB. 2010 Flaming pyrolysis model of the fixed bed cross draft long-stick wood gasifier. *Fuel Processing Technology* 91: 669-675.

Shin, D; Choi, S. 2000 The combustion of simulated waste particles in a fixed bed. *Combustion and Flame* 121: 167-180 DOI: 10.1016/S0010-2180(99)00124-8

Sommariva, S; Grana, R; Maffei, T; Pierucci, S; Ranzi E. 2011 A kinetic approach to the mathematical model of fixed bed gasifiers. *Computers and Chemical Engineering* 35: 928-935 DOI: 10.1016/j.compchemeng.2011.01.036

Starley, GP; Bradshaw, FW; Carrel, CS; Pershing, DW. 1985 The influence of bed-region stoichiometry on nitric oxide formation in fixed-bed coal combustion. *Combustion and Flame* 59: 197-211

Stubenberger, G; Scharler, R; Zahirovic, S; Obernberger, I. 2008 Experimental investigation of nitrogen species release from different solid biomass fuels as a basis for release models. *Fuel* 87: 793-806 DOI: 10.1016/j.fuel.2007.05.034

Stubington, JF; Fenton, H. 1984 Combustion Characteristics of Dried and Pelletized Bagasse. *Combustion Science and Technology* 37: 285-299 DOI: 10.1080/00102208408923758

Sun, QS; Yu, S; Wang, FC; Wang, J. 2011 Decomposition and gasification of pyrolysis volatiles from pine wood through a bed of hot char. *Fuel* 90: 1041-1048 DOI: 10.1016/j.fuel.2010.12.015

Thunman, H; Leckner, B. 2002 Modeling of the combustion front in a countercurrent fuel converter. *Proceedings of the Combustion Institute* 29: 511-518 DOI: 10.1016/S1540-7489(02)80066-9

Thunman, H; Leckner, B. 2003. Co-current and counter-current fixed bed combustion of biofuel - a comparison. *Fuel* 82: 275-283 Article Number: PII S0016-2361(02)00289-2 DOI: 10.1016/S0016-2361(02)00289-2 2003 Co-current and counter-current fixed bed combustion of biofuel - a comparison. *Fuel* 82: 275-283 DOI: 10.1016/S0016-2361(02)00289-2

Tinaut, FV; Melgar, A; Perez, JF; Horrillo, A. 2008 Effect of biomass particle size and air superficial velocity on the gasification process in a downdraft fixed bed gasifier. An experimental and modelling study. *Fuel Processing Technology* 89: 1076-1089 DOI: 10.1016/j.fuproc.2008.04.010

van Blijderveen, M; Gucho, EM; Brammer, EA; Brem, G. 2010 Spontaneous ignition of wood, char and RDF in a lab scale packed bed. *Fuel* 89: 2393-2404. DOI: 10.1016/j.fuel.2010.01.021

van der Lans, RP; Pedersen, LT; Jensen, A; Glarborg, P; Dam-Johansen, K. 2000 Modelling and experiments of straw combustion in a grate furnace. *Biomass & Bioenergy* 19: 199-208 DOI: 10.1016/S0961-9534(00)00033-7.

van Kessel, LBM; Arendsen, ARJ; de Boer-Meulman, PDM; Brem, G. 2004 The effect of air preheating on the combustion of solid fuels on a grate. *Fuel* 83: 1123-1131 DOI: 10.1016/j.fuel.2003.11.008

van Kuijk, H; van Oijen, J; Bastiaans, R; de Goey, P. 2008 Reverse combustion: Kinetically controlled and mass transfer controlled conversion front structures. *Combustion and Flame* 153: 417-433 DOI: 10.1016/j.combustflame.2008.02.002

Varunkumar, S; Rajan, NKS; Mukunda, HS. 2011b Single particle and packed bed combustion in modern gasifier stoves—density effects. *Combustion Science and Technology* 183: 1147-1163.

Varunkumar, S; Rajan, NKS; Mukunda, HS 2011a Experimental and computational studies on a gasifier based stove. *Energy Conversion and Management* 53: 135–141

Weissinger, A; Fleckl, T; Obernberger, I. 2004 In situ FT-IR spectroscopic investigations of species from biomass fuels in a laboratory-scale combustor: the release of nitrogenous species. *Combustion and Flame* 137: 403-417 DOI: 10.1016/j.combustflame.2004.02.010

Wurzenberger, JC; Wallner, S; Raupenstrauch, H; Khinast, JG. 2002 Thermal conversion of biomass: Comprehensive reactor and particle modeling. *AIChE Journal* 48: 2398-2411 DOI: 10.1002/aic.690481029

Yang, YB; Goh, YR; Zakaria, R; Nasserzadeh, V; Swithenbank, J. 2002 Mathematical modelling of MSW incineration on a travelling bed. *Waste Management* 22: 369-380 DOI: 10.1016/S0956-053X(02)00019-3

Yang, YB; Ryu, C; Khor, A; Sharifi, VN; Swithenbank, J. 2005 Fuel size effect on pinewood combustion in a packed bed. *Fuel* 84: 2026-2038 DOI: 10.1016/j.fuel.2005.04.022

Yang, YB; Ryu, C; Khor, A; Yates, NE; Sharifi, VN; Swithenbank, J. 2005 Effect of fuel properties on biomass combustion. Part II. Modelling approach - identification of the controlling factors. *Fuel* 84: 2116-2130 DOI: 10.1016/j.fuel.2005.04.023

Yang, YB; Sharifi, VN; Swithenbank, J. 2004 Effect of air flow rate and fuel moisture on the burning behaviours of biomass and simulated municipal solid wastes in packed beds. *Fuel* 83: 1553-1562 DOI: 10.1016/j.fuel.2004.01.016

Yang, YB; Yamauchi, H; Nasserzadeh, V; Swithenbank, J. 2003 Effects of fuel devolatilisation on the combustion of wood chips and incineration of simulated municipal solid wastes in a packed bed. *Fuel* 82: 2205-2221 DOI: 10.1016/S0016-2361(03)00145-5

Yang, YB; Sharifi, VN; Swithenbank, J. 2006 Substoichiometric conversion of biomass and solid wastes to energy in packed beds. *AIChE Journal* 52: 809-817 DOI: 10.1002/aic.10646

Yang, YB; Phan, AN; Ryu, C; Sharifi, V; Swithenbank, J. 2007 Mathematical modelling of slow pyrolysis of segregated solid wastes in a packed-bed pyrolyser. *Fuel*, 86: 169-180. DOI: 10.1016/j.fuel.2006.07.012

Yang, WH; Ponzio, A; Lucas, C; Blaslak, W. 2006 Performance analysis of a fixed-bed biomass gasifier using high-temperature air. *Fuel Processing Technology* 87: 235-245 DOI: 10.1016/j.fuproc.2005.08.004.

Zhao W; Li Z; Zhao G; Zhang F; Zhu Q. 2008 Effect of air preheating and fuel moisture on combustion characteristics of corn straw in a fixed bed. *Energy Conversion and Management* 49: 3560-3565

Zhou, H; Jensen, AD; Glarborg, P; Jensen, PA; Kavaliauskas, A. 2005 Numerical modeling of straw combustion in a fixed bed. *Fuel* 84: 389-403 DOI: 10.1016/j.fuel.2004.09.020

Zhou, X; Torero, JL; Goudeau, JC; Bregeon, B. 1995 On the propagation of a reaction front through a porous fuel in the presence of an opposed forced flow: Application to mixtures characteristic of municipal waste. *Combustion Science and Technology* 111: 123-146

Liu, YH; Che, DF. 2006 Releases of NO and its precursors from coal combustion in a fixed bed. *Fuel Processing Technology* 87: 355-362 DOI: 10.1016/j.fuproc.2005.10.002