

## BTG Biomass Technology Group BV

### Papers Research and Technology Development

#### Pyrolysis

- *Fast pyrolysis technology development*, RH Venderbosch, W Prins, *Biofuels, Bioprod. Bioref.* 4:178–208 (2010).
- *Characterization of hydrotreated fast pyrolysis liquids*, A. Oasmaa, E. Kuoppala, A. Ardiyanti, RH Venderbosch, HJ Heeres, 2010, *Energy & Fuels*, 24(9), 5264-5272.
- *Valorisation of Jatropha curcas L. plant parts; nut shell conversion to fast pyrolysis oil*, Manurung R., Wever D.A.Z., Wildschut J., Venderbosch R.H., Hidayat H., van Dam J.E.G., Leijenhorst E.J., Broekhuis A.A., Heeres H.J., 2009, *Chemical Engineering Research and Design, Food and Bioproducts Processing*, 87 (3), 187-196.
- *Development of a Pre-treatment Plant for Residues from the Malaysian Palm Oil Industry*, Robbie Venderbosch; Teng Kek Hup and Harold Boerrigter, *Palm oil engineering bulletin* No. 99, pp 49
- *Comparison of properties of upgraded fast pyrolysis oils to other biofuels*, A Alcalá, AV Bridgwater, L. van de Beld, D. Chiaramonti, , 2012, submitted to *Biomass and Bioenergy*.
- *Flash Pyrolysis of Wood for Energy and Chemicals: part 1*, Venderbosch R.H., Prins W., Wagenaar B.M., 1999, *NPT Procestechologie*, 6, 18-23.
- *Flash Pyrolysis of Wood for Energy and Chemicals: part 2*, RH Venderbosch, W. Prins, BM Wagenaar, 2000, *NPT Procestechologie*, 1, 16-20.

#### Energy from Pyrolysis oil

- *The use of pyrolysis oil and pyrolysis oil derived fuels in diesel engines for CHP applications*, L. van de Beld, E. Holle, J. Florijn, , 2012, submitted to *Applied Energy*.
- *An experimental study on the use of pyrolysis oil in diesel engines for CHP applications*, L. van de Beld, E. Holle, J. Florijn, 19th European Biomass Conference and Exhibition, 6-10 June 2011, pp. 1181-1187.
- *Using biomass-based fuels including pyrolysis liquids for power and CHP production*, L. van de Beld, J. Vos, J. Florijn, A. Kronberg, M. Glouchenkov, M. Sprenkeler, D. Chiaramonti, AM Rizzo, V Kirillov, N. Khripach, L. Lezhnev, B. Papkin, AV Bridgwater, E. Wylde, A. Alcalá, S. Silin, 18th European Biomass Conference and Exhibition, May 2011, Lyon.
- *Bio-oil as a coal substitute in a 600 MW<sub>e</sub> Power Station*, BM Wagenaar, RH Venderbosch, W Prins, F Penninks, 12<sup>th</sup> European Conference and technology Exhibition on Biomass for Energy, Industry and Climate Protection, 17-21 June 2002, Amsterdam, The Netherlands.

- *BioSlurry™ for co-firing and gasification, Pyrolysis and gasification of Biomass and Waste*, RH Venderbosch, BM Wagenaar, E Gansekoele, J Florijn, 2002, , Strasbourg, France, 289-297.

### Biofuels from pyrolysis oil

- *Pyrolysis Oil Stabilisation by Catalytic Hydrotreatment*, RH Venderbosch and HJ Heeres, Biofuel's Engineering Process Technology, pp 386.
- *Stabilization of biomass-derived pyrolysis oils*, R.H. Venderbosch, A.R. Ardiyanti, J. Wildschut, A. Oasmaa and H.J. Heeres, *J Chem Technol Biotechnol* 2010; 85: 674–686.
- *Catalytic Hydrotreatment of Fast Pyrolysis Oil: Model Studies on Reaction Pathways for the carbohydrate Fraction*, J. Wildschut, J. Arentz, C.B. Rasrendra, R.H. Venderbosch, H.J. Heeres, *Environmental Progress & Sustainable Energy*, 2009.
- *Hydrotreatment of fast pyrolysis oil using heterogeneous noble-metal catalysts*, J Wildschut., FH Mahfud, RH Venderbosch, HJ Heeres, 2009, *Industrial and Engineering Chemistry Research*, 48(23), 2009, Pages 10324-10334.
- *Insights in the hydrotreatment of fast pyrolysis oil using a ruthenium on carbon catalyst* , Wildschut J., Iqbal M.H., Melián Cabrera I.V., Venderbosch R.H., Heeres H.J., 2010, *Energy Environ. Sci.*, DOI:10.1039/b923170f.
- *Pyrolysis oil upgrading by high pressure thermal treatment* , De Miguel Mercader F., Hogendoorn J.A., Venderbosch R.H., Kersten S.R.A., Groeneveld M.J., 2010, , *Fuel*, 89(10), 2829-2837.
- *Stabilisation of biomass derived pyrolysis oils*, RH Venderbosch, AR Ardiyanti, J Wildschut, A Oasmaa, HJ Heeres, 2010, , *J. Chem. Techn. Biotechn.*, 85, 674-686.
- *Process-product studies on pyrolysis oil upgrading by hydrotreatment with Ru/C catalysts*, AR Ardiyanti, RH Venderbosch, HJ Heeres, *Proceedings of the 2009 AIChE Spring National Meeting*, Tampa, 2009.

### Gasification

- *Staged gasification: clean fuel through innovative coupling of existing thermochemical conversion systems*, E. Leijenhurst, L. van de Beld, , 17<sup>th</sup> European biomass conference and exhibition, 29 june – 3 july, 2009, pp. 847-854.
- *Entrained flow gasification of bio-oil for synthesis gas*, R.H. Venderbosch, L. van de Beld, W. Prins, *European Bio-energy conference*, Amsterdam, June 17-21, 2002.
- *Preliminary techno-economic analysis of large-scale synthesis gas manufacturing from imported biomass, Pyrolysis and gasification of Biomass and Waste*, HP Calis, JP Haan, H Boerrigter, A Van der Drift, G Peppink, R Van den Broek, A Faaij, RH Venderbosch, 2002, , Strasbourg, France, 403-418.

## Supercritical Water

- *Reforming of methanol and glycerol in supercritical water*, J.G. van Bennekom, R.H. Venderbosch, D. Assink, H.J. Heeres, J. of Supercritical Fluids 58 (2011) 99– 113
- *Supermethanol: reforming of crude glycerine in supercritical water to produce methanol for re-use in biodiesel plants*, J.G van Bennekom, J. Vos, R.H. Venderbosch, M.A. Paris Torres, V.A. Kirilov, H.J. Heeres, Z. Knez, M. Bork, J.M.L. Penninger, 17<sup>th</sup> European biomass conference and exhibition - Hamburg, 29 June – 3 July, 2009
- *Biomass gasification in near- and super-critical water: status and prospects*, Matsumura, Yukihiko and Minowa, Tomoaki and Potic, Biljana and Kersten, Sascha R.A. and Prins, Wolter and Swaaij van, Willibrordus P.M. and Beld van de, Bert and Elliott, Douglas C. and Neuenschwander, Gary G. and Kruse, Andrea and Antal Jr., Michael Jerry (2005) Biomass and Bioenergy, 29 (4). pp. 269-292.
- *Gasification of biomass in supercritical water*, B. Potic, L.van de Beld, D. Assink, W. Prins\* and W.P.M. van Swaaij, , Amsterdam conference, 2002.
- *SWS process for production of hydrogen integrated with generation of clean energy*, J.M.L. Penninger, B.M. Wagenaar, D. Assink, L. van de Beld, , 1<sup>st</sup> European Hydrogen Conference, Grenoble France, September 2003.
- *Biomass and waste conversion in supercritical water for the production of renewable hydrogen*, L. van de Beld, B.M. Wagenaar, D. Assink, B. Potic, S. Kersten, W. Prins, W.P.M. van Swaaij, J.M.L. Penninger, 1<sup>st</sup> European Hydrogen Conference, Grenoble France, September 2003.
- *Exploring new production methods of hydrogen/natural gas blends for mixing into the natural gas network of the Netherlands*, L. van de Beld, I. Bouwmans, P.A.M. Claassen, K. Hemmes, H. de Wit, N. Woudstra, Th. Woudstra, J.L. Zachariah, ECOS 2003, Denmark.
- *Production of Biofuels via Hydrothermal Conversion*, in: *Handbook of Biofuels Production: Process and Technologies*, SRA Kersten, D Knežević, RH Venderbosch, 2011, Woodhead Publishing Limited, ISBN978-1-84569-510-1

## Chemicals & Materials

- *Recovery of acetic acid from an aqueous pyrolysis oil phase by reactive extraction using tri-n-octylamine*, C.B. Rasrendra, B. Girisuta, H.H. van de Bovenkamp, J.G.M. Winkelman, E.J. Leijenhorst, R.H. Venderbosch, M. Windt, D. Meier, H.J. Heeres, Chemical Engineering Journal 176– 177 (2011) 244– 252
- *Acetic Acid Recovery from Fast Pyrolysis Oil. An Exploratory Study on Liquid-Liquid Reactive Extraction using Aliphatic Tertiary Amines*, FH Mahfud, F van Geel, RH Venderbosch, HJ Heeres, 2008, Separation Science and Technology, 43 (11-12), p. 3056-3074