Aston University
Engineering & Applied Science

Rigorous, Relevant **Research**

Bioenergy

▶ Introduction

Fast pyrolysis is a process for turning solid biomass such as wood, grass and straw into a liquid which can be used as a fuel for heat and power or can be upgraded to transport fuels or renewable chemicals. The attraction of the process is that very high yields of liquids are obtained (up to 75%) and the liquid is much easier to store, transport and use than solid biomass.

▶ Sponsors and funders

- European Commission
- EPSRC
- Private industry
- IEA Bioenergy.

▶ Academic partners

The Bioenergy Research Group (BERG) collaborates extensively with other universities in the UK and Europe. Professor Tony Bridgwater is the Scientific Director of the SUPERGEN Bioenergy Project which brings together expertise from around the UK. BERG also collaborates extensively with European partners in Biosynergy and the Bioenergy Network of Excellence.

▶ Key projects

- SUPERGEN Bioenergy is a consortium of 14 academic partners and ten companies and is managed by Aston University. It focuses on all aspects of bioenergy from growing crops to the production of valuable biofuels, chemicals heat and power.
- Biosynergy is an EC sponsored Integrated Project with 17 partners across Europe examining the development of advanced biorefineries based on an integrated approach to biomass processing for fuels and chemicals.
- There are another eight ongoing projects around the world on a wide range of bioenergy related topics.
- Apart from project management, the Aston contribution in all cases is in the thermal processing of biomass, upgrading of products to valuable and useful energy, fuel and chemical products, and evaluation of alternative processes.

▶ Applications

Two patents have been filed on a novel fast pyrolysis reactor and process improvements for fast pyrolysis of difficult materials. Other patents are under consideration in several related areas.

▶ Recent publications

- Fahmi R, Bridgwater AV, Darvell LI, Jones JM, Yates N, Thain SC and Donnison IS, “The effect of alkali metals on combustion and pyrolysis of Lolium and Festuca grasses, switchgrass and willow”, Fuel, 86, Issues 10-11, July-August 2007, pp 1560-1569.
- Czernik S and Bridgwater AV, “Applications of Biomass Fast Pyrolysis Oil”, Energy and Fuel, 18, 590-598, 2004.
- Bridgwater AV, Carson P, and Coulson M, “A comparison of fast and slow pyrolysis liquids from mallee”, International Journal of Global Energy Issues, 27, 2, pp 204-216 (2007).
- Boukis I Ph, Grammelis P, Berzegianni S and Bridgwater AV, “CFB air-blown flash pyrolysis Part I: Engineering design and cold model performance”, Fuel 86 (2007) pp 1372-1386.
- Bridgwater AV, Toft AJ and Brammer JG, “A technoeconomic comparison of power production by biomass fast pyrolysis with gasification and combustion”, Sustainable and Renewable Energy Reviews, 6 (3) pp 181-248 (2002) ISSN 1-364-0321.
- Papadikis K, Bridgwater AV and Gu S, “CFD modelling of the fast pyrolysis of biomass in fluidised bed reactors. Part A: Eulerian computation of momentum transport in bubbling fluidised beds”, Chemical Engineering Science (2008), doi:10.1016 /j.ces.2008.05.045.

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Other information

The Bioenergy Research Group has extensive processing and analytical facilities for biomass conversion to useful and valuable products. Full details are available on request. Enquiries are welcome.