



Ablative Pyrolyser

Scientists at Aston University have developed a thermolysis reactor for the conversion of solid biomass into bio-oil, for use in power and heat generation, as a precursor for biofuels, and as a raw material for chemicals and other speciality products. Aston's Business Partnership Unit is now actively seeking commercial partners to license this innovative technology.

Advantages

- Bio-oil output that is comparable to the best fast pyrolysis reactors
- Higher specific throughputs
- Lower reactor and system volume
- Lower capital and running costs
- Much larger particles of biomass

Background

Fast pyrolysis is the only technology that directly produces a liquid fuel through the high temperature processing of renewable solid biomass such as wood or agricultural waste. The process is typically performed in fluid beds at around 500°C, but is limited by particle size, heat transfer and scaling problems. Most pyrolysis processes utilise heat transfer from a hot gas and/or solid, such as sand, to the biomass. To achieve rapid heating of the biomass, small-sized (<2-3mm) feedstock particles are required.

The Technology

Aston's ablative pyrolysis reactor offers the potential for very high specific throughputs with reduced equipment size, lower energy usage, and a corresponding drop in reactor, liquid collection and char removal costs. This technique involves the 'melting' or 'thermal erosion' of biomass that comes into contact with a hot surface (above 430°C) by applying high mechanical pressure ($>1 \times 10^5$ Pa) to the particles as they traverse the surface. Over 85wt% of the biomass "melts" initially, then vaporises off the hot surface. Vapours are then cooled and collected to form a liquid bio-oil product. This process has several other advantages over existing fast pyrolysis techniques.

- Transfer of heat through a reacting liquid film on the solid surface leads to higher specific throughputs and lower operating costs
- Significantly lower reactor volume and capital costs due to lesser requirement for inert gas and no requirement for recycle gas
- Much larger biomass particles can be fed, such as whole tree chips of up to 50mm, rather than the small-sized particles of typically 3mm required by other fast pyrolysis techniques, thus reducing feed preparation costs
- Novel process applications for synthesis of renewable products, such as slow release nitrogenous fertiliser, resins, and adhesives



Intellectual Property Protection

This technology has been granted a US patent:

<i>Title</i>	<i>Granted Patents</i>	<i>Priority Claimed</i>	<i>Our Ref</i>
Ablative Pyrolysis	US 7,625,532	January 10, 2002	PAT-2004-013

Further Information

Further information can be made available and commercial discussions commenced on entering into a non-disclosure agreement.

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