



# Staged Pyrolysis

Scientists in Aston's European Bioenergy Research Institute have devised a novel reactor that minimizes the production of tar during biomass pyrolysis. Aston's Business Partnership Unit is now actively seeking commercial partners to license this highly useful technology.

## Highlights

- Produces bio-oil with low tar content
- Improves handling, storage and refining of bio-oil
- Utilizes multiple stages to progressively dry, heat and pyrolyse biomass
- Especially suitable for abundant woody biomass

## Background

Bio-oil contains some 200 types of organic compound, including alcohols, phenols, aldehydes, and organic acids. Tar—organic compounds with high molecular masses (>300 amu)—is an undesirable by-product of the biomass pyrolysis process, especially during the pyrolysis of abundant woody biomass. Such compounds are at least partly formed from degraded lignin, which results from condensation and fragmentation of large lignin molecules during pyrolysis. Excessive tar causes separation of bio-oil into disparate phases, which makes handling and storage difficult and prevents further refining of the bio-oil. It is therefore desirable to limit the tar content of bio-oil.

## The Technology

Scientists in Aston's European Bioenergy Research Institute have devised a novel reactor that minimizes the production of tar during biomass pyrolysis. The reactor subjects biomass feedstock particles to a staged heat treatment: an initial drying stage (100°C to 250°C), a pre-pyrolysis heating stage (280°C to 350°C), and the pyrolysis stage itself (350°C to 550°C). At each stage, the biomass particles are held within these temperature ranges for at least five seconds. Such "staged-intermediate" pyrolysis produces bio-fuels with relatively low tar content, which is highly useful in dual fuel applications, such as cogeneration.



## Intellectual Property Protection

This technology is the subject of a PCT patent application:

<i>Title</i>	<i>Patents Pending</i>	<i>Priority Claimed</i>	<i>Our Ref</i>
Biomass Pyrolysis	PCT/GB2010/000939	May 11, 2009	PAT-2008-003

## Further Information

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

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