

# Green chemistry offers route towards zero-waste production

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Novel green chemical technologies will play a key role helping society move towards the elimination of waste while offering a wider range of products from biorefineries, according to a University of York scientist.

Professor James Clark, Director of the University's [Green Chemistry](#) Centre of Excellence, will tell a symposium at the Annual meeting of the American Association for the Advancement of Science (AAAS) that the use of low environmental impact green [chemical](#) technologies will help ensure that products are genuinely and verifiably green and sustainable.

He says the extraction of valuable chemicals from biomass could form the initial processing step of many future biorefineries.

"We have shown that wax products with numerous applications, can be extracted from crop and other by-products including wheat and barley straws, timber residues and grasses, using supercritical [carbon dioxide](#) – a green chemical technology that allows the production of products with no solvent residues," he says.

"The extracted residues can be used in applications including construction as well as in bioprocessing."

Low-temperature microwaves can also be used to pyrolyse biomass, allowing greater control over the heating process. The process results in significant energy savings and produces high quality oils, and oils and solids with useful chemical properties.

Professor Clark says that combining continuous extraction with microwave irradiation, it is possible separate an aqueous phase leaving the oils cleaner, less acidic and with lower quantities of other contaminants such as alkali metals. The oils have significant potential as feedstocks for making chemical products as well as for blending into transport fuels.

"Our microwave technology can also be tuned to produce bio-chars with calorific values and physical properties that make them suitable for co-firing with coal in power-stations," he adds.

**More information:** Professor Clark will be among the speakers the session 'Biorefinery: Toward an Industrial Metabolism' at the Annual Meeting of the AAAS, Washington, D.C. on Friday, 18 February, 2011.

Provided by University of York

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