



The Australian Synchrotron's facilities are helping to make Australia's environment more sustainable for industry.

The Australian Synchrotron is one of the nation's most important landmark research infrastructure platforms. Thousands of Australian and international researchers use the unique properties of synchrotron light to accelerate breakthroughs to support our environment. The Australian Synchrotron provides services to a wide range of Australian businesses to assist in activities that can improve the environment.

## Reducing methane emissions

The Synchrotron's Infra-Red Microspectroscopy Beamline is helping turn dried bloodmeal, a waste product of red meat processing, into a compostable plastic that breaks down without harmful by-products. The new plastic, Novatein<sup>®</sup>, is an alternative to petrochemical-based plastics, which are known to produce high levels of methane as they decompose. The study, a collaboration with Aduro Biopolymers, will see the material used in products such as pots, trays and containers and its widespread use has the potential to significantly decrease harmful methane emissions.

## Green cement lowers CO<sub>2</sub> emissions

Traditional cement is one of the largest sources of CO<sub>2</sub> emissions in the world. Using the Infra-Red Microspectroscopy beamline, Australian company Zeobond studied the molecular structure of the waste material, fly ash – the by-product of coal burning manufacturing, to determine how they could be used in concrete, resulting in a product called E-Crete<sup>™</sup>. These materials are helping support the evolving green construction industry by both making use of waste materials and reducing carbon emissions by a factor of five compared to conventional concrete.



The Synchrotron was integral to the development of E-crete<sup>™</sup> which is making use of waste produces and lowering CO<sub>2</sub> emissions.

## Using the environment to store carbon

Leaf litter is an important source of carbon, contributing to the aquatic food web as well as the formation of stored organic carbon. In wetland areas, aquatic fungi plays a critical role in decomposing gum leaves into biodegradable forms and non-biodegradable forms that keep carbon locked up in long-term storage, which is beneficial for the environment.

As part of a collaboration with La Trobe University's, Murray-Darling Freshwater Research Centre, the Australian Synchrotron's Infra-Red Microspectroscopy Beamline is being used to learn more about how eucalypt leaves degrade in wetland areas and the resulting balance between bio-available and sequestered carbon.

## Innovation to power the future

Alloy membranes that can absorb and then release hydrogen are big business, with existing and potential applications including synthetic diesel fuel production and refuelling for fuel cell-powered vehicles which are better for our environment. Australian Synchrotron findings are determining the alloy compositions most suitable for large-scale hydrogen production using metal membranes.