

# Renewable Chemicals

SCIENCE AND  
INDUSTRY  
ENDOWMENT  
FUND



SIEF  
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RESEARCH

## SIEF is supporting Advanced Catalytic Processes for Renewable Chemicals Manufacture.

**the challenge** To develop low energy / sustainable materials platform technologies that utilise renewable resources to produce bulk chemicals, intermediates, fine and specialty chemicals. The challenge is to invigorate the Australian agriculture and manufacturing sectors by linking them via innovative biorefinery technologies.

**the response** Two complementary approaches are being explored to produce renewable resources:

- **Chemical Processing:** Utilising hydrothermal upgrading to convert woody and algal biomass into gaseous and liquid fractions. Further processing, separation and derivatisation of these fractions can result in the production of a range of valuable chemicals.
- **Enzymatic Processing:** Through the development of novel, efficient, small footprint, tethered enzyme continuous flow reactors, these reactors can be used to convert bio-derived feedstock's (e.g. product streams from the Chemical Processing stream) into fine and speciality chemicals.

These approaches will enable renewable resources to be developed for the future, with better environmental credentials, all from sustainable sources.

**the collaboration** The project is a collaboration between the University of Sydney and CSIRO, which builds on internationally recognised expertise in thermochemical processing, catalysis (both chemical and bio-catalytic), enzymology, chemical engineering, modelling, flow chemistry, separation and purification processes, and polymers and materials science. It is the synergistic combination of the partner's capabilities, experience and expertise that has enabled the development of the complimentary technologies.

**projected impact** Development of technologies to manufacture renewable resources will impact in a number of areas:

- Environmental value by reducing reliance on fossil crude-oil-based chemical products (e.g. renewable resins and composite materials).
- Increased sustainability and economic value by being able to create renewable chemicals and fuels from biomass streams ranging from wood wastes, algae, bio-solids from e.g. waste water treatment plants and food wastes.
- Developments that will underpin the growth of the bio-economy in Australia.
- Production of Unique Tethered Enzyme Reactor technologies that provide efficient alternatives to chemical production and bio-remediation challenges. The key advantage of the Enzyme reactors is the assembly of individual enzymatic reactions into complex, co-ordinated pathways that include co-factor recycling capabilities, (i.e. multi-enzyme 'molecular machines'). This provides an economical advantage.

### Contact us

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### What is SIEF?

Spanning a history of over 85 years, the Science and Industry Endowment Fund (SIEF) provides grants to science and scientists for the purposes of assisting Australian industry, furthering the interests of the Australian community and contributing to the achievement of Australian national objectives. In 2009 this unique and esteemed funding arrangement was rejuvenated by a gift from CSIRO, made possible due to the commercial success of CSIRO's fast WLAN, or Wi-Fi technology. Thus past accomplishments are reinvested into new science and innovation for the nation.