



## Polymers by design

Using the latest in synthesis and process technologies, we can design and synthesise well-defined polymers to meet the needs of industry.



### Polymer science at CSIRO

We have broad multidisciplinary capability in chemical synthesis with skills and expertise in design, synthesis, characterisation and process development. Our Polymers Team combines its expertise in polymer chemistry, synthetic chemistry, polymer analysis and characterisation to create precisely engineered polymers. Our world-leading polymer science capabilities include:

- Controlled free radical polymerisation
- Reactive extrusion
- Condensation polymerisation
- Biomedical polymer synthesis
- Polymer processing.

### Polymerisation technologies

We offer a range of polymerisation methods and process technologies.

#### Free radical polymerisation

Reversible Addition- Fragmentation chain Transfer (RAFT) polymerisation technology is an established form of controlled free radical polymerisation. RAFT makes possible the rational design of well-defined polymeric structures. It can be used in a wide range of monomers and reaction conditions and provides access to polymers with unprecedented control over molecular weight and narrow molecular weight distributions, composition and architecture. RAFT can be used for solution, emulsion and suspension polymerisations, and in batch as well as flow chemistry.

## Anionic polymerisation

Anionic polymerisation is another form of controlled addition polymerisation of vinyl monomers, providing access to polymers with predicted molecular weights, narrow molecular weight distributions, and defined end-groups. CSIRO's ability to perform anionic polymerisation using continuous processing methods (Flow Chemistry) removes the problem of batch-to-batch reproducibility encountered using batch processing.

## Condensation polymerisation

Condensation polymerisation is a step-growth polymerisation process that can be used with non-vinyl monomers. CSIRO has used this technology to design and synthesise biostable and biodegradable polymers such as [Elast-Eon™](#); a biocompatible polyurethane employed in the fabrication of medical implants and devices used in replacing biological tissues.

## Capability

We have a range of [characterisation facilities](#) including:

- Microscopy
- X-ray Science
- Spectroscopy and spectrometry
- Surface analysis
- Thermal and mechanical analysis
- Chromatography
- Analytical chemistry



Our research activities are supported by modern scale-up facilities, including batch reactors with capacities ranging from 10 to 250 L, [FloWorks](#), CSIRO's Centre for Industrial Flow Chemistry provides access to cutting-edge R&D into industrial processing, and [The Rapid Automated Materials and Processing \(RAMP\)](#) facility accelerating the development of new advanced materials and processes.

## Our services

We provide a fully integrated service, including:

- R&D services
- Process development

Pilot-scale manufacture through our partner [Boron Molecular](#).

**As Australia's national science agency and innovation catalyst, CSIRO is solving the greatest challenges through innovative science and technology.**

CSIRO. Unlocking a better future for everyone.

### Contact us

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