



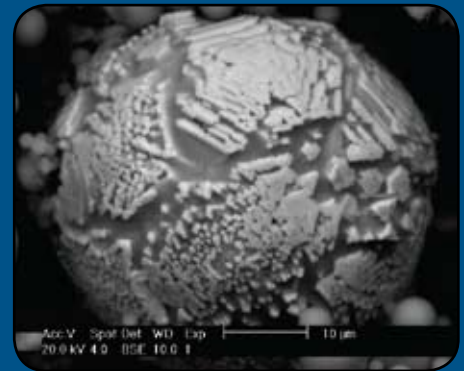
# Geopolymers

## What is CSRP?

The Centre for Sustainable Resource Processing (CSRP) aims to create new methods to produce minerals and metals in a way that benefits the community, the environment and industry. It has a vision of sustainable minerals processing and metals production—satisfying the global material needs of society with significantly reduced ecological impacts. To achieve this, CSRP aims to find technological solutions for progressively eliminating waste and emissions in the materials cycle, while enhancing business performance and meeting community expectations.

## What are Geopolymers

Geopolymers are a class of inorganic polymers formed by the reaction between an alkali and an aluminosilicate source. These materials have an amorphous 3-dimensional structure that gives geopolymers properties which make them an ideal substitute for Ordinary Portland Cement (OPC) in a whole range of applications. Many by-products produced by industry can be used as feedstocks for geopolymer, including fly ash, mine tailings and bauxite residues. Variations in the ratio of aluminium to silicon, and alkali to silicon, produce geopolymers with different physical and mechanical properties.



## Environmental Benefits

Using geopolymers to replace OPC cements in concrete structures and ready-mix applications has the potential to provide the following environmental advantages:

- Significantly reduce Greenhouse Gas emission
- Use large volumes of industrial (waste) by-products
- Increase resource efficiency by producing concrete products with longer services lives

## Geopolymer Properties

- High Compressive Strength
- High Tensile Strength (Relative to OPC)
- Resistant to Acid Corrosion
- Heat and Fire Resistant



## CSRP's Unique Capabilities

The advantage CSRP has is its ability to undertake fundamental research and test the viability of geopolymers as an applied technology. The CSRP Geopolymer team has expertise in chemistry, materials science and civil and mechanical engineering. The research organisations, located across Australia, have the capabilities to focus on nano-scale laboratory testing through to bench and long term/ large scale testing.

## The Future of the Geopolymer Program

The Centre for Sustainable Resource Processing (CSRP) plans to continue with geopolymer research until a viable foundation is established to sustain the geopolymer program under its own funding. The process involves continuing support for fundamental science and demonstrations of geopolymer technology as well as creating a Geopolymer Alliance which is charged with establishing the lasting legacy of a Geopolymer Foundation.



## Geopolymer Alliance

### Main Aims:

- Networking of researchers, industry and government authorities
- A referral centre
- Industry training through conferences and workshops
- The transition to a Geopolymer Foundation which in addition aims to:
  - Promote GP Research and Development and help with funding
  - Help with the formulation of Australian Standards and Codes of Practice
  - Broker technology



## Fundamental Science

### Materials Physics

FIB-SEM  
TEM  
XRD  
SAXS  
Orbital Centrifugal Mixer

### Materials Chemistry

FTIR  
Raman  
NMR  
Particle Sizing

### Materials Engineering

Process optimisation  
Strength  
Wear Resistance  
Durability  
Heat Transmission  
Fire Resistance  
Acoustic Performance  
Chemical Resistance



## Fundamental Research

### Main Aims:

- Identify Raw Materials for GP production
- Understand the mechanisms of geopolymerisation
- Understand the factors influencing GP properties
- Optimise the durability of hardened GP's
- Understand steel corrosion mechanisms when embedded in the GP matrix.

## Demonstration Products

### Main Aims:

- Identify industry focus and predict industry demand
- Adapt local by-products and beneficiate (Concentrate or enrich them) where necessary
- Develop products to field trial stages and monitor their performance over time

## Industry Partners



**For further information, please visit [www.csrp.com.au](http://www.csrp.com.au) or contact:**

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