

# New geopolymers have multiple benefits

Geopolymers are new ceramic-like, inorganic composite building materials produced at low temperatures with dramatically lower emissions compared to concrete. Add in that they are fully recyclable, as well as fire, blast, and acid-resistant, and it's obvious why they have the potential to transform the building products industry.

Working with industry partners, Research leader Dr Kwesi Sagoe-Crentsil and his team from CSIRO are taking Australia into this new field of building innovation. He says uses of geopolymers are almost limitless given that their properties include that they are adhesive, castable, extrudable, sprayable and strong.

'They can be used in all structural, panel and precast applications and ready mixes. Our work is concentrating on using them instead of cement and incorporating the technology into building products and coatings,' Sagoe-Crentsil says.

His team is now investigating ways that the geopolymer technology can be used in new and existing applications. The cost of using geopolymer-based building materials is similar to existing materials, but the technical benefits are expected to be far greater.

Dr Sagoe-Crentsil says, 'Using geopolymers in industrial flooring, piping or coatings for example could help cut back on damage done through industrial spills, improve long-term performance, reduce capital or maintenance costs and perhaps help to lower insurance costs.'

The environment should also benefit. Compared to regular cement where every one tonne manufactured results in one tonne of carbon dioxide being produced, geopolymer technology has the potential to reduce emissions by 80 per cent because high-temperature calcining is not needed. It also utilises fly ash, a waste product from power stations.

Also, because they are derived from natural minerals, geopolymers can be readily converted to recycled aggregate for use as road base or aggregates for precast concrete production.

The team's work in the area is now two fold. It is conducting fundamental research so that geopolymer technology can be better understood, and secondly is investigating ways the technology can be used in new and existing applications.



The new geopolymer technology could dramatically reduce the emissions 'footprint' of the high volumes of concrete currently used in building and infrastructure construction. Charles Taylor

Dr Sagoe-Crentsil says some companies are expected to have geopolymer products in the marketplace in the coming year. He admits the technology has yet to fully capture the imagination of the building industry, because the transition from a well-established material such as cement to a novel one is difficult.

But he says, 'We are working with a number of building products manufacturers to further develop and commercialise geopolymer technology, and we are already engaged and expanding partnerships within the construction sector. Overseas market opportunities are also being explored.'

Although CSIRO and its commercial partners will be concentrating on construction and manufacturing, potential geopolymer uses are wide-ranging. They include adhesives, aggregates, coatings, composites, conduits, fibres and textiles, fluid containment, insulation, marine structures, refractories, soil stabilisation and waste encapsulation.

**Contact:**

Mr Everard Hunder, Marketing Manager,  
CSIRO Manufacturing & Infrastructure  
Technology, (03) 9252 6439,  
Everard.Hunder@csiro.au