

Environmental Award

Development of Geopolymer Concrete for On-Site Casting



Obayashi Corporation

Pozzolith Solutions Limited

Nippon Steel Corporation

The production of Portland cement, the main raw material in ordinary concrete, emits approximately 770 kg/t of carbon dioxide. This makes the cement industry the third largest emitter of carbon dioxide after electric power and steel. Reducing carbon dioxide emissions is an important issue for the industry. Geopolymers are cement alternatives with carbon dioxide emissions only 20% to 35% those of ordinary concrete. They are based on the solidification property of a mixture of alumina silica powder (which consists mainly of fly ash, a byproduct of thermal power plants) and blast furnace slag powder (a byproduct of steelmaking) brought about by the addition of an alkaline solution.

Conventional geopolymers have only been used in factory-made secondary concrete products because they require thermal curing to obtain a suitable setting time for casting. In this newly developed geopolymer, the addition of a special dispersing agent allows the required strength to be obtained in a serviceable time with on-site curing at ambient temperature. The carbon emissions of this geopolymer are similar to those of other geopolymers.

As this technology becomes more versatile in the future, it is expected to contribute to a future carbon-neutral society. For this reason, the technology was judged to be worthy of receiving the JSCE Environmental Award.