Development and Application of Geopolymer Technology in Taiwan

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Geopolymers are inorganic polymer materials formed by the reaction of aluminosilicate raw materials (such as fly ash, slag, or metakaolin) with an alkaline activator. Compared with traditional Portland cement, materials prepared by geopolymer technology have excellent engineering properties, such as high early strength, room temperature hardening, good fire resistance and heat insulation ability, nice acid/alkali resistance ability, nice durability, and low carbon emissions. Due to their eco-friendly production and excellent performance characteristics, geopolymers have been gradually attracting world attention as potentially revolutionary green materials.

This presentation introduces the latest advances in geopolymer technology in Taiwan, focusing on innovative material integration and sustainable development. Key projects and commercial applications led by National Taipei University of Technology will be highlighted, showcasing breakthroughs and the scalability potential of geopolymer products. In line with Taiwan's circular economy goals, special emphasis will be placed on applying these high-value materials.

In presentation includes the development and application of geopolymer technology in ready-mixed concrete, the development of precast high early-strength geopolymer concrete, the application of geopolymer technology on waste reutilization, and the research progress of geopolymer-based Ceramic Composites.

Finally, the focus of future research will be introduced, using geopolymer technology on 3D printing, producing porous adsorption carriers, and developing ultra-high temperature refractory materials. We hope to continue to expand the diversified application potential of geopolymer technology.