鹼激發爐石混凝土

Alkali-Activated Slag Concrete

作者

蔡嘉榮1*、花基益2 、吳柏緯2

所屬單位

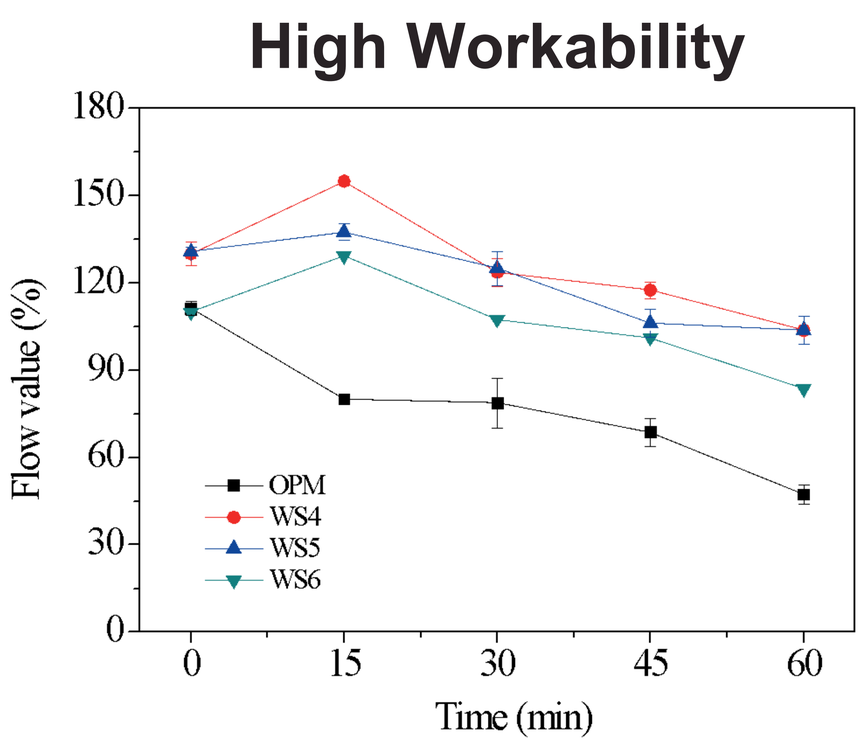
1屏東科技大學土木工程系副教授
2屏東科技大學土木工程系研究生

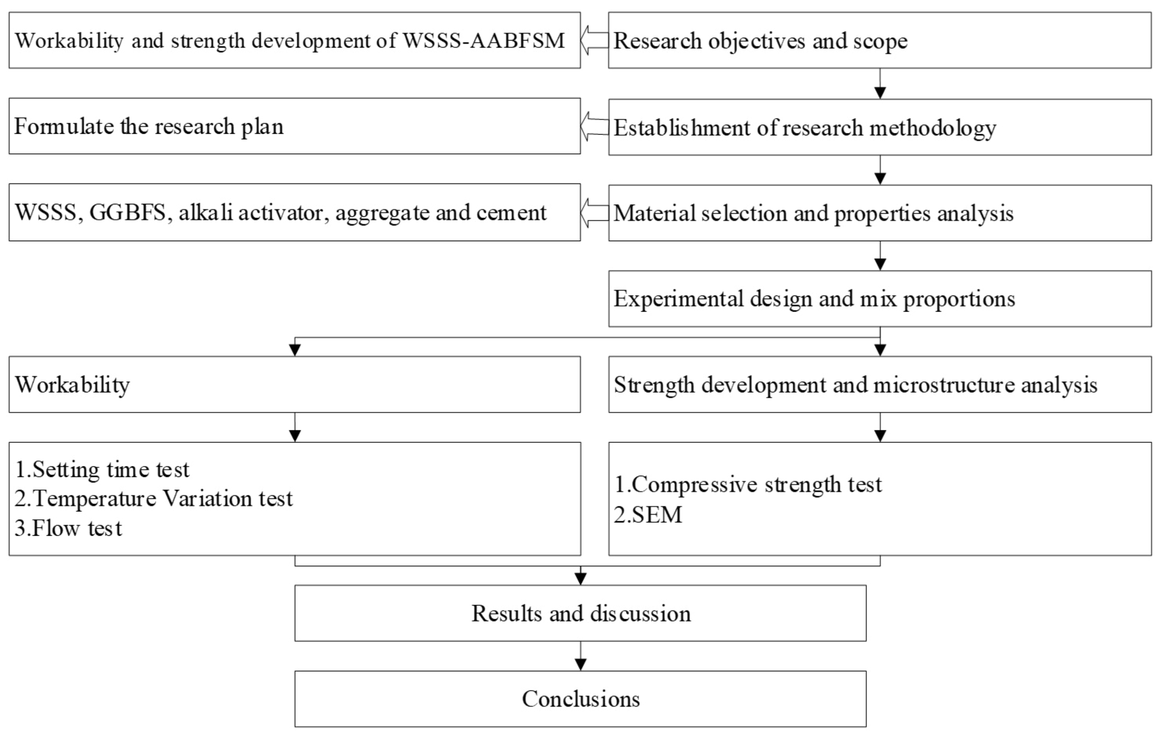
本案專利所屬計畫編號：NSTC 112-2410-H-020-004 -

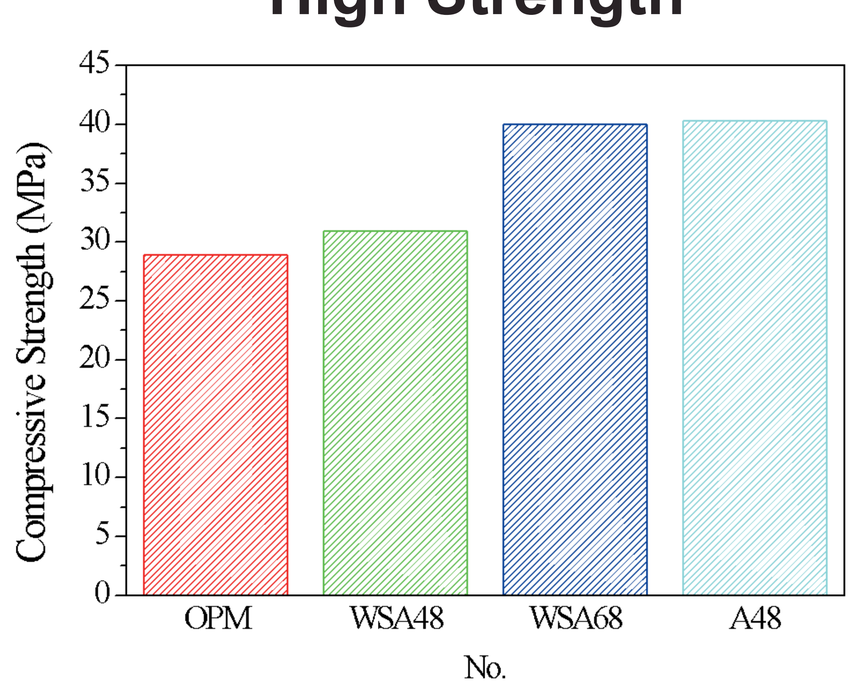
摘要 Abstract

過去，混凝土結構的生產高度依賴水泥及天然粒料，不僅造成大量碳排放，也導致資源過度消耗與環境衝擊。如今，鹼激發爐石混凝土作為低碳建材的新技術，透過無機聚合反應有效取代卜特蘭水泥，減緩水泥生產過程的碳排放問題。本技術更進一步利用廢水玻璃鑄造砂替代天然粒料與化學藥劑，並持續優化材料配比與製程，顯著降低碳排放與能源消耗，同時保持與傳統砂漿、混凝土相當的性能表現。未來若能廣泛推行至工程實務領域，將有助於推動綠色低碳建材的普及與永續發展。

In the past, the production of concrete structures heavily relied on cement and natural aggregates, which not only resulted in significant carbon emissions but also led to excessive resource consumption and environmental impacts. Today, alkali-activated slag concrete has emerged as a low-carbon construction material technology that effectively replaces Portland cement through inorganic polymerization, thereby mitigating the carbon emissions associated with cement production. Furthermore, this technology incorporates waste sodium silicate foundry sand as a substitute for natural aggregates and chemical additives, while continuously optimizing material proportions and processing methods. As a result, it significantly reduces carbon emissions and energy consumption, while maintaining performance comparable to that of conventional mortar and concrete. If widely implemented in engineering practice, it will help promote the adoption of green, low-carbon building materials and contribute to sustainable development.

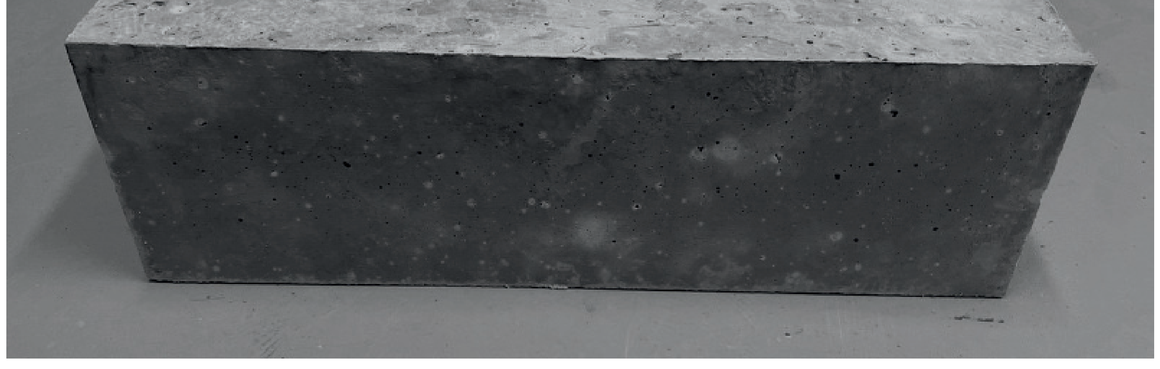






鹼激發爐石混凝土-廢棄水玻璃鑄造砂

Alkali-Activated Slag Concrete – Waste Sodium Silicate Foundry Sand



誌　謝 | 本研究感謝，志純實業股份有限公司支持。

Acknowledgements | This study thanks CHIH CHUEN INDUSTRY Co., Ltd. for their support.