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Development of Zero-Cement Binder Activated by Carbonation

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Abstract : Stainless steel slag (STS) is a by-product generated from the stainless steel refining process. The recycling of STS produced in Korea for construction applications is limited due to its poor hydraulic properties. On the other hand, STS has high carbonation reactivity to CO2 as it contains gamma-C2S content. This material is ideal for mineral carbonation which is one of the techniques proposed for carbon emission reduction. The objective of this study is to investigate the feasibility of developing a zero-cement STS binder activated by carbonation as alternative cementitious material. The quantitative analyses for CO2 uptake of STS powder and STS blended cement were investigated using thermogravimetric analysis (TGA), X-ray diffraction (XRD). In addition, the compressive strength and microstructure of STS pastes after CO2 curing were evaluated. Test results showed that STS can be activated by carbonation to gain a sufficient strength as alternative cementitious material.

Keywords : gamma-C2S, CO2 uptake, carbonation, stainless steel slag
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