

عنوان مقاله:

Modified Concrete for Impeding Chloride Diffusion from Sea Water in the Marine Environment

محل انتشار:

مجله انرژی تجدیدپذیر و محیط زیست، دوره 9، شماره 3 (سال: 1401)

تعداد صفحات اصل مقاله: 15

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خلاصه مقاله:

The application of nanomaterials to concrete is an innovative approach to enhance mechanical properties and durability performances. In this work, the addition of a combination of Graphene Oxide Nano-Platelets (GONP) and Ground Granulated Blast Furnace Slag (GGBFS) was studied as admixture in concrete. Tests on mechanical and chloride permeation properties were conducted. The results showed that the mix with ۰.۰۵ % GONP and the mix with ۳۰ % GGBFS obtained better mechanical strength than the rest of the mixes. The highest electrical resistivity was achieved for the ۹۰-day cured sample with ۵۰ % GGBFS in GONP-free concrete and the ۰.۰۱ % GONP in GGBFS-free concrete, which was found to be the most effective in increasing concrete resistance to chloride permeation. The mix with ۰.۱ w % GONP and ۵۰ w % GGBFS exhibited considerable performance even with other mechanical and durability performances. The addition of ۰.۱ % graphene oxide and ۵۰ % granular slag increased the compressive strength of the concrete sample by ۱۹.۹ % during ۲۸ days and ۱۷.۶ % during ۹۰ days compared to the conventional concrete sample. Concrete with a combination of ۰.۱ % graphene oxide and ۵۰ % granular slag experienced an increase in flexural strength by ۱۵ % during ۲۸ days and ۱۳.۶ % during ۹۰ days. A significant reduction in electrical conductivity from ۴۰۱۲C to ۱۲۰۰C was observed for ۹۰-day cured samples containing ۰.۱ wt % GO and ۵۰ wt % GGBFS compared to the conventional sample. Response Surface Method (RSM) applied to the test data presented an optimized concrete mix containing ۰.۰۸ w % GONP and ۵۰ w % GGBFS, the outcome of which was in close agreement with the experimental results.

کلمات کلیدی:

Chloride, Diffusion, graphene oxide, Marine environment, ground granulated blast furnace slag

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