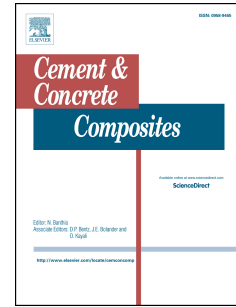


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1 **Effects of graphene sulfonate nanosheets on mechanical and thermal properties of sacrificial**
2 **concrete during high temperature exposure**

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8 **Abstract:** Using nanomaterials is a new method to improve concrete material, and graphene or its
9 derivatives are currently the most attractive nanomaterials. The study aims to evaluating the effects
10 of graphene sulfonate nanosheets (GSNSs) on physical, mechanical, and thermal properties of
11 sacrificial concrete. The microstructure, porosity, compressive strength, thermal analysis,
12 coefficient of thermal expansion (CTE), thermal diffusivity, and ablation behavior of sacrificial
13 concrete with different contents of GSNSs before and during exposure to various temperatures up to
14 1000 °C were comprehensively investigated. A new experimental apparatus was used to measure the
15 compressive strength of sacrificial concrete during elevated temperature exposure. It was found that,
16 (1) the compressive strength, thermal diffusivity, and decomposition enthalpy of sacrificial concrete
17 could increase by 10.14—23.11%, 6.51—27.66%, and 7.48%, respectively, when adding 0.1 wt%
18 GSNSs; (2) the porosity and ablation velocity of sacrificial concrete could reduce by 2.00—6.00%
19 and 7.48%, respectively, due to the incorporation of GSNSs.

20 **Key words:** sacrificial concrete; graphene sulfonate nanosheets; porosity; compressive strength;

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