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1 Comparative evaluation on the dispersion and stability of graphene oxide in 2 water and cement pore solution by incorporating silica fume

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17 18 **Abstract**

19 Many literatures have reported that the dispersion of carbon nanomaterials (CNs) in cement
20 matrix can be improved by incorporating silica fume (SF) due to its ultra-fine size. Most of
21 works characterized the dispersion of CNs and SF in hardened cement matrix by scanning
22 electron microscopy (SEM) and investigated their dispersion by measuring the mechanical
23 properties of cement composites modified by both. However, SEM is not a good tool to
24 investigate the dispersion of nano-scaled materials in macro-scaled cement matrix due to the
25 extreme high magnification, and the interaction between the SF and CNs in cement matrix is still
26 not clear and hardly to be revealed due to the small dosage of both in cement. The present work
27 aims to give a comparative study on the effect of SF on the dispersion and stability of graphene
28 oxide (GO), one of the most popular CNs, in the solutions of neutral water and alkaline cement
29 pore solutions (CPS), instead of hardened cement matrix. The UV-vis spectroscopy and zeta
30 potential results indicate that the addition of SF can improve the dispersion and stability of GO in

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