Development Of Piezo-Resistive Cement-Based Composites With Few Layer Graphene Oxide As Conductive Filler

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Self-sensing cement-based composites can be used for crack detection and damage monitoring in civil construction infrastructure. This type of composite is obtained by incorporating conductive fillers, which induce a piezoresistive response, into a cement-based matrix. Among the different conductive fillers, few layer graphene oxide (GO) can be considered a low cost alternative. This work explores the viability of a GO/cement composite for self-sensing applications. GO was synthetized from graphite using the Hummers method and exfoliated in water. Cement pastes were prepared with different GO additions by mass of cement. Composites piezoresistivity was measured after 28 days of curing in a humid environment by appling fifteen cycles of uniaxial compressive loads. X-Ray diffraction and RAMAN spectroscopy results confirmed that the synthetized material presented GO structure. Optical microscopy images showed that the exfoliation process was efficient enough to generate a sheet-like material with two dimensions in the scale of the micrometers. The fractional change in resistivity (FCR) results showed that the presence of GO as conductive filler in the cement matrix decreased the overall electrical resistivity of the material. It was concluded that the composite has potencial for the development of piezo-resistive civil construction concretes.