Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary information

Mechanical properties, microstructure and mechanism of carbon nanotubes reinforced oil well cement-based nanocomposites

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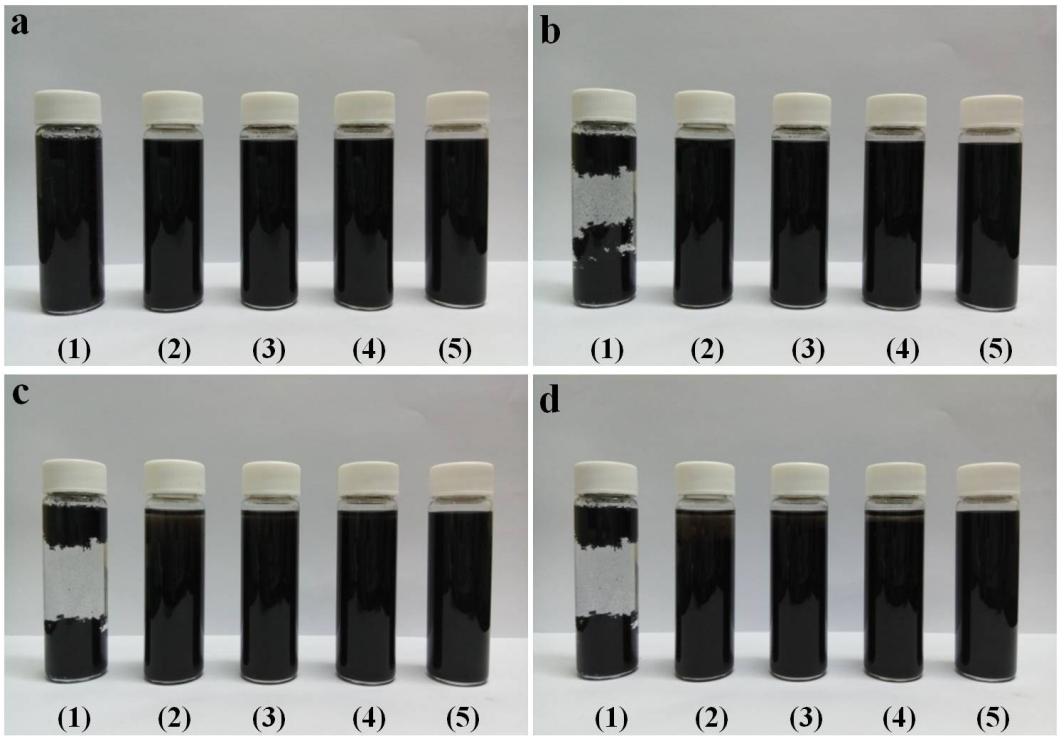

Figure S1. The dispersion of MWCNTs suspensions after standing for (a) 0 h; (b) 4 h; (c) 16 h; (d) 32 h.

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Figure S1 presents the dispersion of MWCNTs suspensions containing different surfactants at different times after ultrasonication. All the prepared suspensions showed a homogeneous black color after the ultrasonic process in Figure S1a. Large quantities of MWCNTs were agglomerated and precipitated when settling for 4 h in the first group, no precipitation was occurred in the other groups (Figure S1b). After the MWCNTs dispersions were allowed to stand for 16 h in Figure S1c, the suspensions of the top layer in the second group became gray and some MWCNTs were precipitated. Meanwhile, a little precipitation was appeared in the third and fourth groups. As shown in Figure S1d, the gray area of the top layer was expanded with more precipitation of MWCNTs in the second and third groups. In the fourth group, MWCNTs was precipitated gradually and the suspensions color was slightly lighter, the dispersion degree of MWCNTs was reduced. In contrast, MWCNTs suspensions dispersed with TNWDIS in the fifth group remained blacker in color than

other suspensions after standing for 32 h. There was almost no precipitation and the dispersion of MWCNTs was still very stable. Therefore, dispersion agent TNWDIS has the best dispersion effect on MWCNTs.

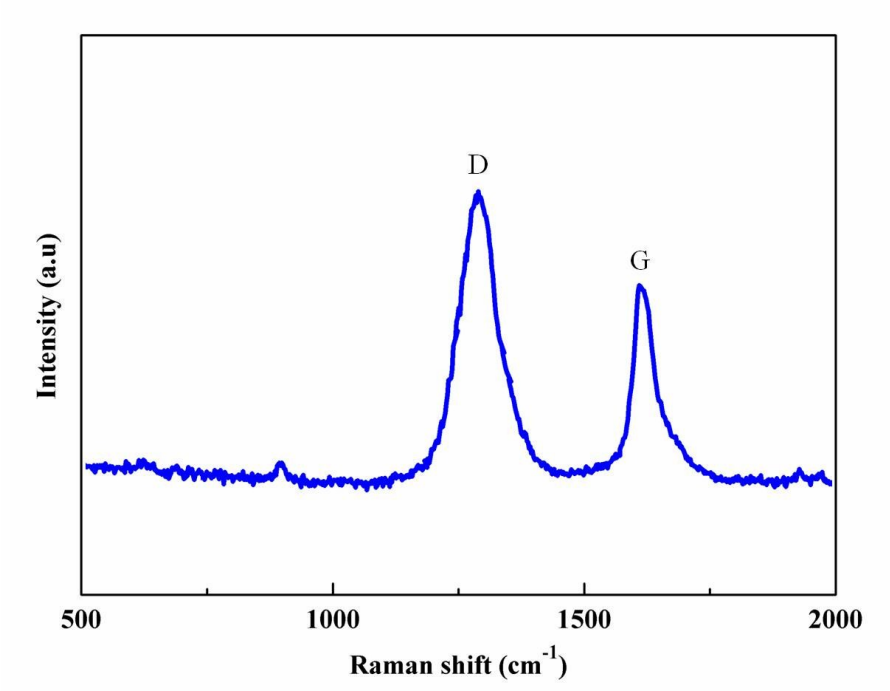

Figure S2. Raman spectroscopy of MWCNTs.

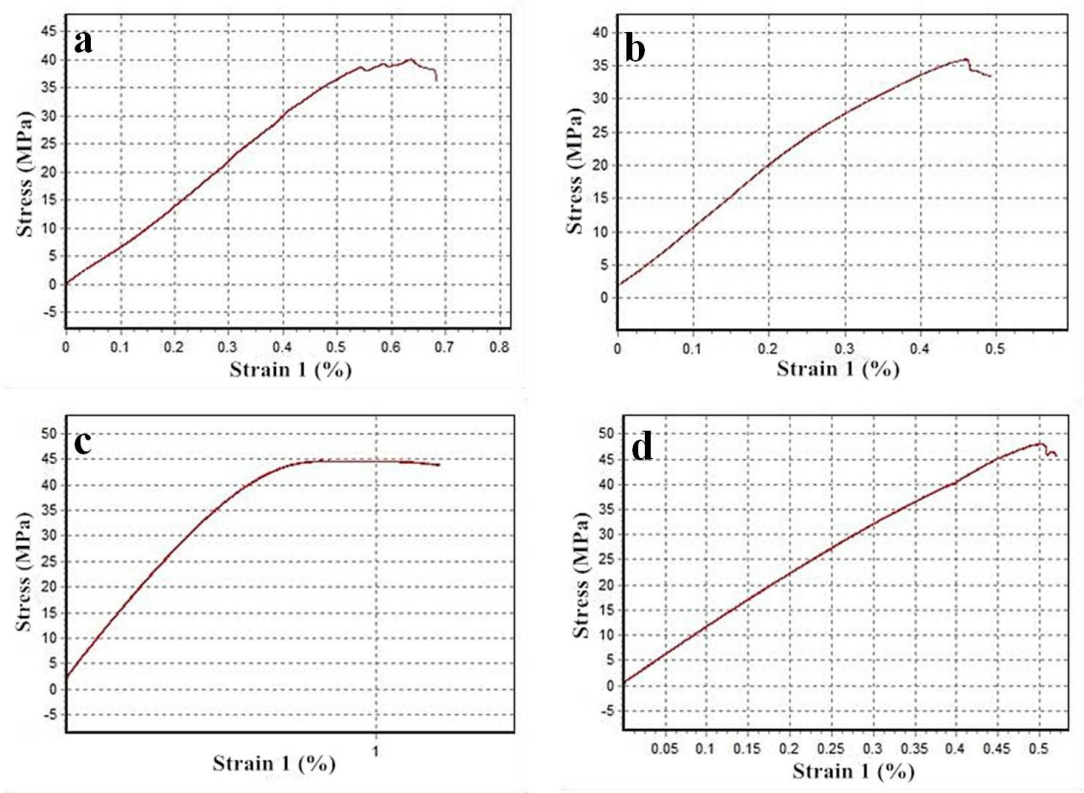

Figure S3. Images of uniaxial and triaxial mechanical properties of cementitious samples. (a. Uniaxial stress-strain curve of sample C2; b. Uniaxial stress-strain curve of sample P; c. Triaxial stress-strain curve of sample C2; d. Triaxial stress-strain curve of sample P)

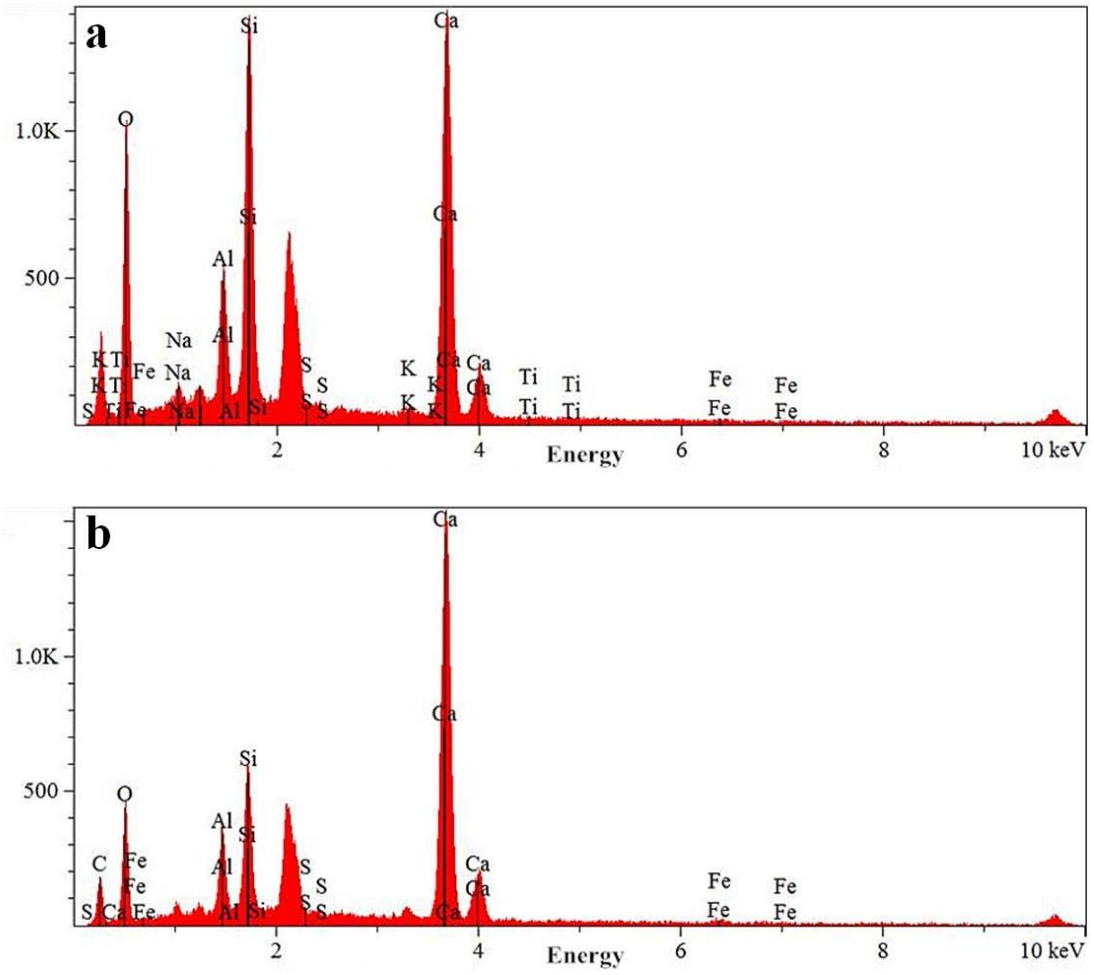

Figure S4. EDS spectra of cementitious samples without and with MWCNTs. (a) EDS 1; (b) EDS 2.