Electronic Supplementary Material (ESI) for RSC Advances.

Supplemental material

A novel AQDS-rGO composite to enhance the bioreduction of As(V)/Fe(III) from the flooded arsenic-rich soil

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Figure: S1-S4

Table: S1

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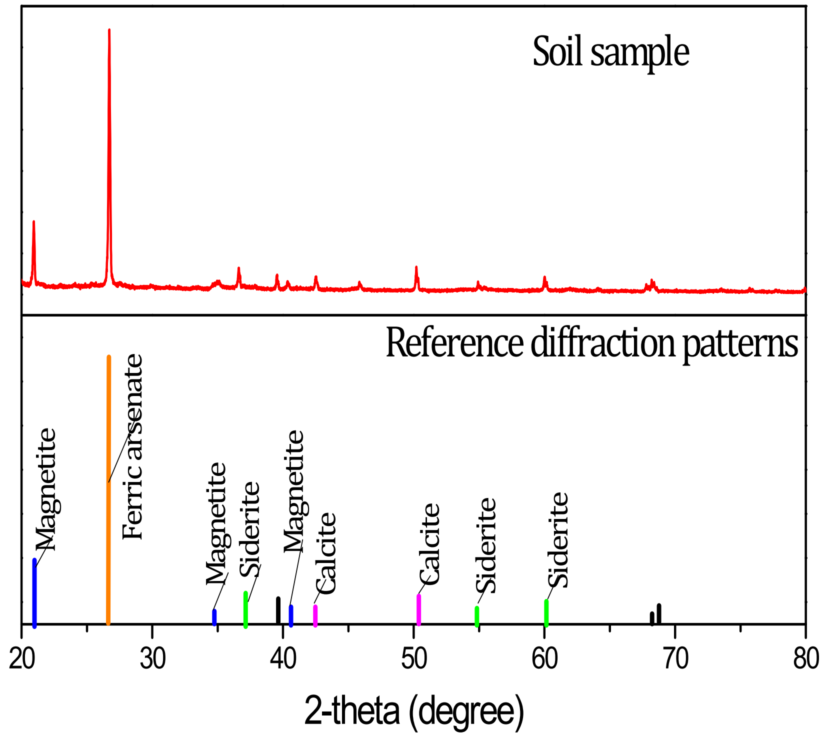

Fig. S1. X-ray diffraction (XRD) of minerals in soil samples.

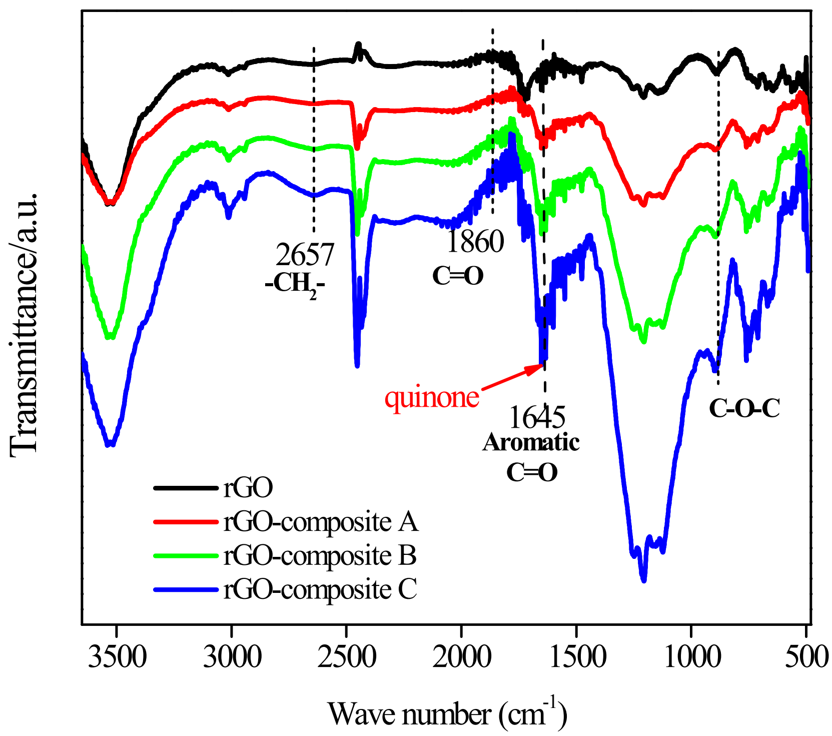

Fig. S2. FTIR spectra characterization of rGO-composite.

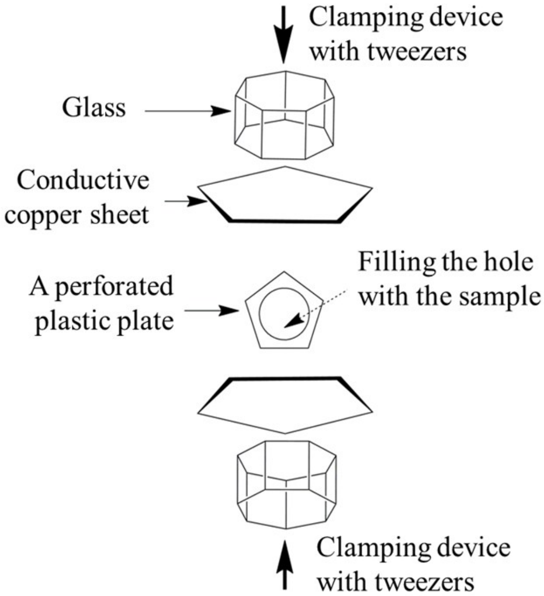

Fig. S3. The impedance-measuring-device system used for the measurement of electrical conductivity.

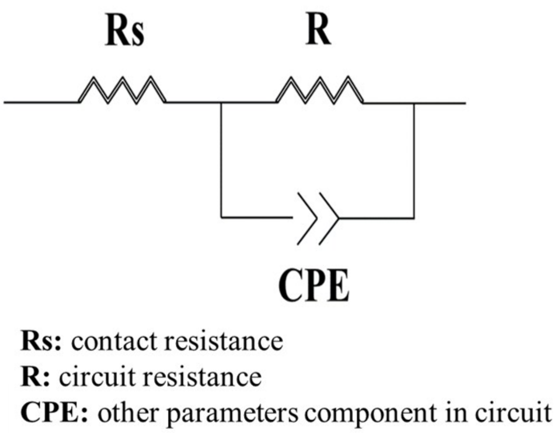

Fig. S4. The schematic of analog circuitry (c) used for the measurement of electrical conductivity.

It's worth noting that the graphene conductivity has been strongly highlighted in many electronic applications territories.[1] Thus, an assumption based on the graphene electrical conductivity (EC) might serve a promotion to the electron transfer under graphene amendments. In this study, the measurement for the electrical conductivity of slurry under corresponding amendments was conducted using a specific impedance measuring device system (Fig. S3) designed by Dongping Zhan *et al* from Engineering Research Center of Electrochemical Technology, Xiamen University, China. Specifically, a certain quality of slurry sample was triplicately eluted using phosphate buffer (0.1 M, pH=7.2) to remove the surface attached residue. Then, eluted slurry was carried out for the step-by-step dehydration by gradient levels (50%, 70%, 80%, 90% and 100%) of ethanol with 15 minutes of soakage in each step. Thereafter, the impedance measurement was employed according to the artificial circuit (Fig. S4) by setting the parameters of DC Voltage (0 V) and current frequency (10^5-10^{-1} Hz). The results could be calculated after incorporating the recorded values from the Software ZView2 into the Equation S1, where L denotes the thickness of dried-slurry, R and S are the resistance and the base circle area (with diameter of 1.2 mm) of filling cavity, respectively. The unit of the electrical conductivity result value is μs/cm.

$$k = \frac{L}{R \times S} \tag{S1}$$

Table S1. The biotic/abiotic amendments conducted in this study.

No.	Amendments
I	Soil (15 g) + Substrate (NaAc: 20 mM, 45 mL)
II	Soil (15 g) + Substrate (NaAc: 50 mM, AQDS: 0.05 mM, 45 mL)
III	Soil (15 g) + Substrate (NaAc: 50 mM, AQDS: 0.10 mM, 45 mL)
IV	Soil (15 g) + Substrate (NaAc: 50 mM, AQDS: 1.00 mM, 45 mL)
V	Soil (15 g) + rGO (40 mg/L) + Substrate (NaAc: 20 mM, 45 mL)
VI	Soil (15 g) + rGO (40 mg/L) +Substrate (NaAc: 50 mM, AQDS: 0.05 mM, 45 mL)
VII	Soil (15 g) + rGO (40 mg/L) + Substrate (NaAc: 50 mM, AQDS: 0.10 mM, 45 mL)
VIII	Soil (15 g) + rGO (40 mg/L) + Substrate (NaAc: 50 mM, AQDS: 1.00 mM, 45 mL)
IX	Soil (15 g) + rGO-composite A (40 mg/L) + Substrate (NaAc: 20 mM, 45 mL)
X	Soil (15 g) + rGO-composite B (40 mg/L) + Substrate (NaAc: 20 mM, 45 mL)
XI	Soil (15 g) + rGO-composite C (40 mg/L) + Substrate (NaAc: 20 mM, 45 mL)

References

1. C. L. Su and K. P. Loh, *Accounts Chem Res*, 2013, **46**, 2275-2285.