

Supplementary Information

A novel rapid synthesis of highly stable silver nanoparticle/carbon quantum dot nanocomposites derived from low-grade coal feedstock

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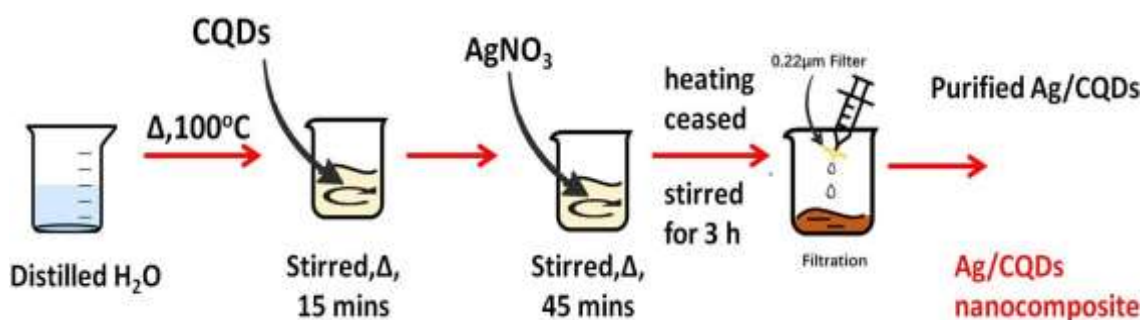


Figure S-1. Schematic diagram of the fabrication of Ag/CQDs nanocomposite

Table S-1. Physico-chemical properties of the coal samples

Coal Sample (Raw)	Proximate Analysis (%)				Ultimate Analysis (%)			TS (%)
	M	VM	Ash	FC	C	H	N	
Coal	2.55	38.87	6.75	51.83	78.46	6.02	0.96	4.09

(M-Moisture; Ash-Ash content; VM-Volatile Matter; FC-Fixed Carbon; C-Carbon; H-Hydrogen; N-Nitrogen; TS-Total Sulfur)

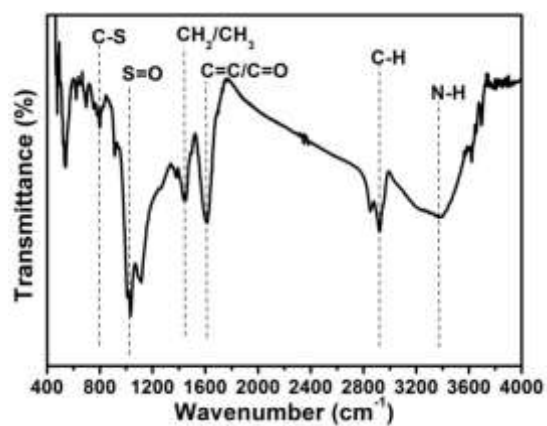


Figure S-2. FTIR spectra of raw coal

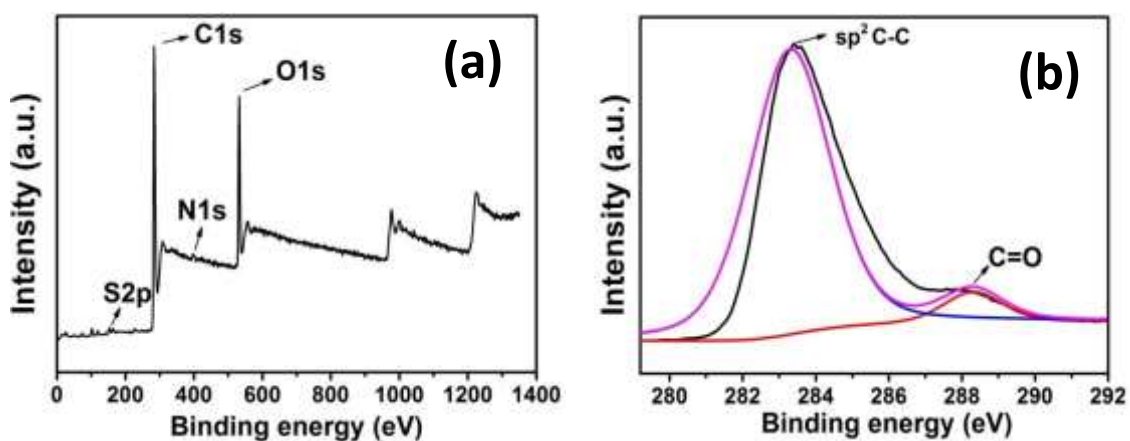


Figure S-3. (a) XPS spectra of raw coal along with the (b) C1s deconvoluted spectra.

Table S-2. XPS data of Ag/CQDs nanocomposite

Sample	Atomic Percentage (%)				
	C (280-292 eV)	O (526-536 eV)	Ag (367-373 eV) (573-603 eV)	N (397-407 eV)	S (164-172 eV)
CQDs	53.17	31.71	-	13.80	1.32
Ag/CQDs	46.35	23.04	17.58	10.98	2.05

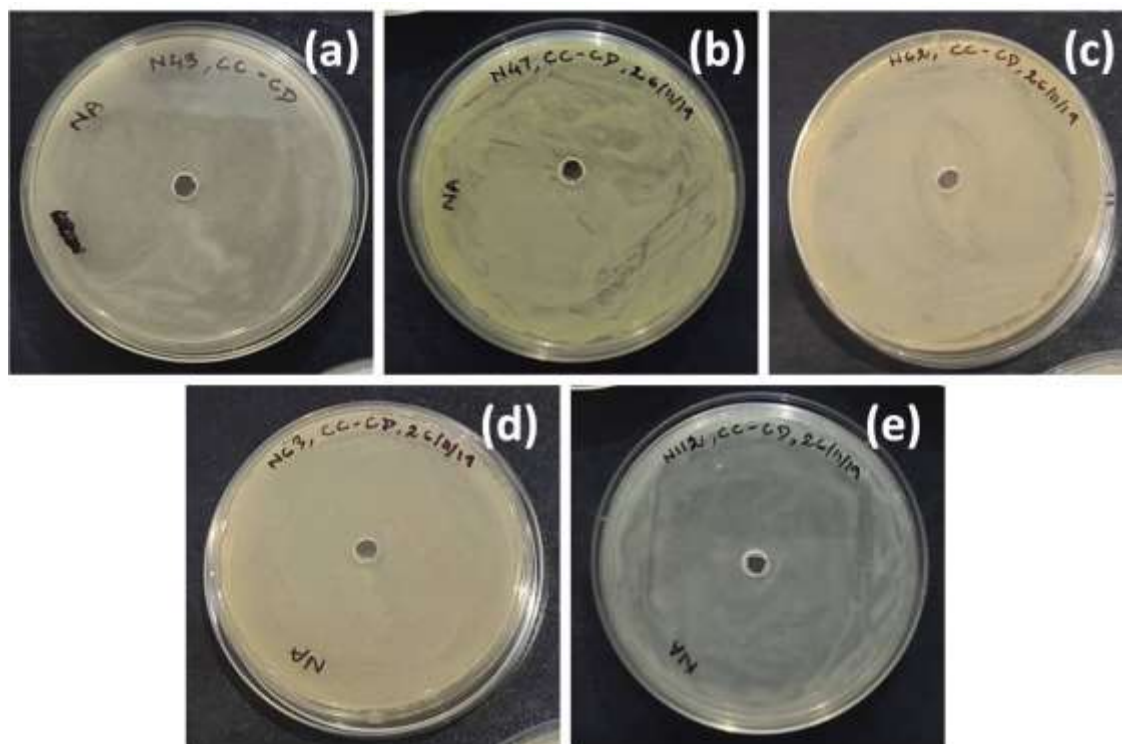


Figure S-4. The antibacterial effect of CQDs against various bacterial strains (a) Photograph of *Bacillus pseudomyoides* bacteria, (b) Photograph of *Glutamibacter nicotianae*, (c) Photograph of *Phytobacter ursingii* bacteria, (d) Photograph of *Bacillus wiedmannii* bacteria, (e) Photograph of *Rhodococcus soli* bacteria.

Table S-3: The inhibition zone diameters of some reported antibacterial nanomaterials

Sample	Bacterial Strain	Inhibition Zone (mm)	Reference
CDs/AgNPs	<i>E. coli</i>	12-13	1
	<i>S. aureus</i>	13-15	
AgNPs	<i>E. coli</i>	12.5	2
	<i>S. aureus</i>	11.5	
AgNPs	<i>E. coli</i>	13	3
	<i>S. aureus</i>	18	
AgNPs	<i>E. coli</i>	22	4
AgNPs	<i>Escherichia coli</i>	12	5
	<i>Bacillus megaterium</i>	6	
AgNPs	<i>E. coli</i>	12	6
AgNPs	<i>Escherichia coli</i>	11	7
	<i>Staphylococcus aureus</i>	13	
	<i>Pseudomonas aeruginosa</i>	12	
AgNPs	<i>E. coli</i>	10.5	8
	<i>S. aureus</i>	9.5	
	<i>Klebsiella pneumoniae</i>	8.5	
	<i>Micrococcus flavus</i>	9	
	<i>Pseudomonas aeruginosa</i>	10.5	
	<i>Bacillus subtilis</i>	10	
GO/AgNPs	<i>S. aureus</i>	9-12	9
Ag/CQDs Nanocomposite	<i>Bacillus pseudomyoides</i>	12	Present Work
	<i>Glutamibacter nicotianae</i>	15	
	<i>Phytobacter ursingii</i>	14	
	<i>Bacillus wiedmannii</i>	16	
	<i>Rhodococcus soli</i>	18	

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