Supporting Information

Sample characterizations

The TEM and HRTEM images were taken using a JEM-2100 (HR) TEM (JEOL), with GQDs directly transferred onto a C-flat TEM grid. The AFM images were obtained on a Digital Instrument Nanoscope IIIA, where a OTESPA-R3 AFM tip was used (Bruker, k: 12-103 N/m) for the tapping mode measurement. The GQDs aqueous solutions were spin coated (3,000 r.p.m., Junwei Technology Co. LTD, Wuhan, China) onto a freshly cleaved mica substrate and dried at room temperature before imaging. XPS spectra were measured on a PHI Quantera SXM scanning X-ray microprobe with a 45 take-off angle and 100 mm beam size; the pass energy for surveys was 140 and 26 eV for high-resolution scans. Raman microscopy was performed with a Renishaw Raman microscope using 514 nm laser excitation at room temperature. An X-ray diffraction (XRD) spectrum was obtained using an Xray powder diffractometer (type: JDX-11P3A, JEOL, Japan). X-ray diffraction data was obtained with the starting angle of 5.00°, a stoping angle of 80.00°, and a step size of 0.05° with a scanning rate of 1° per minute with a Co (l 1/4 1.7902 Å) beam. Time-resolved studies were performed using an Edinburgh Instruments OD470 single-photoncounting spectrometer with a high-speed red detector, and using a 370-nm picosecond pulse diode laser.
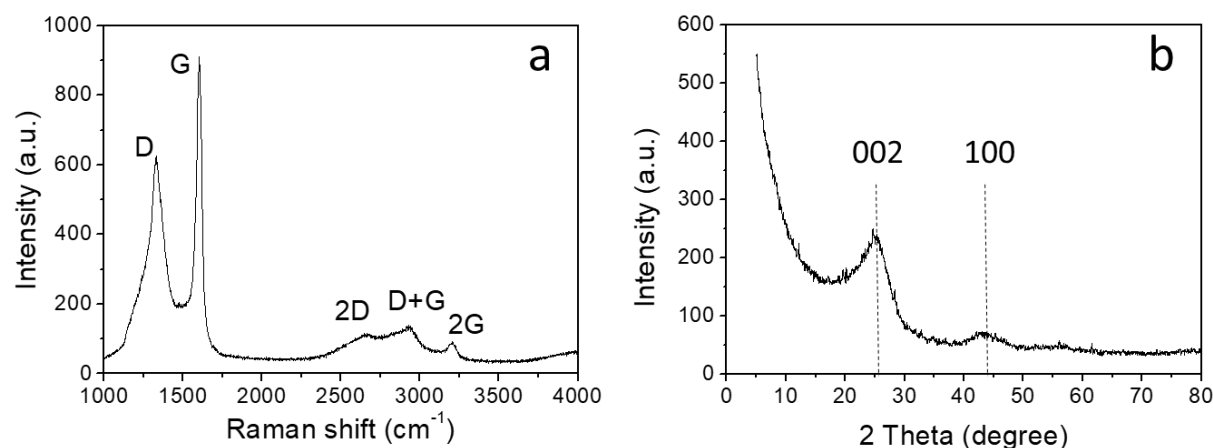

Figure S1. The Raman spectra (a) and XRD spectra (b) of the anthracite coal.

As shown in Fig. S1a, the Raman spectra of anthracite shows D, G, 2D and 2G peaks. XRD of the anthracite coal displays (002) peaks at around 26° corresponding to interlayer spacing of about 0.34 nm, which is close proximity to graphite (~0.35 nm). It powerfully demonstrates that the coal are principally composed of highly conjugate sp^2 carbon domains. Moreover, the

XRD data manifests the graphite (100) band in the neighborhood of 44°, which derives from the small graphite-like structure in coal (Fig. S1b).
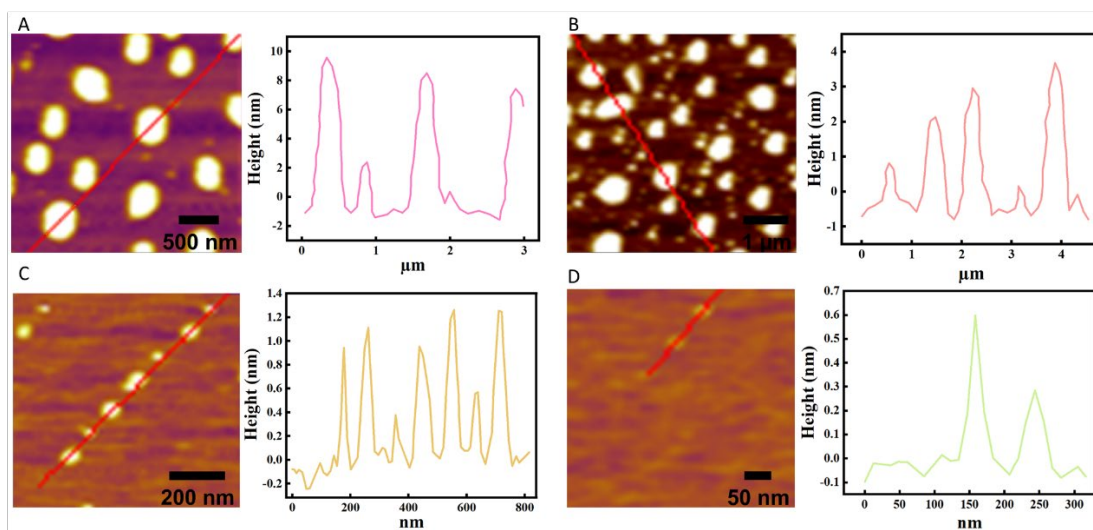

Figure S2. Height profiles of the GQDs 100, GQDs 120, GQDs 130 and GQDs 150 measured by AFM.