Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Green synthesis of Si-GQD nanocomposites as cost-effective catalysts for oxygen reduction reaction

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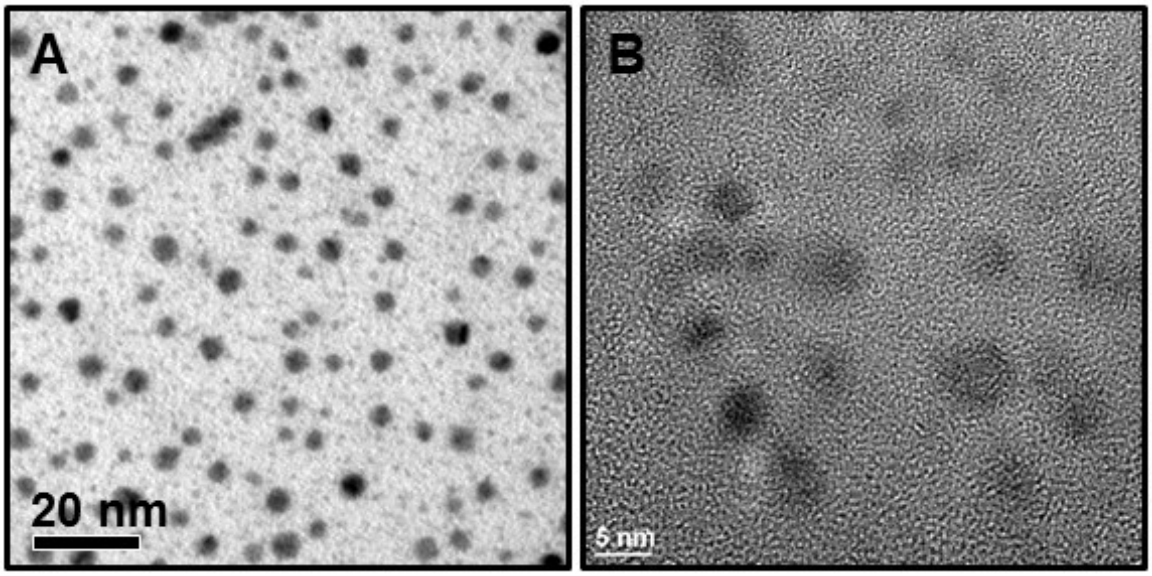

Figure S1. (A) TEM and (B) HRTEM images of GQDs.

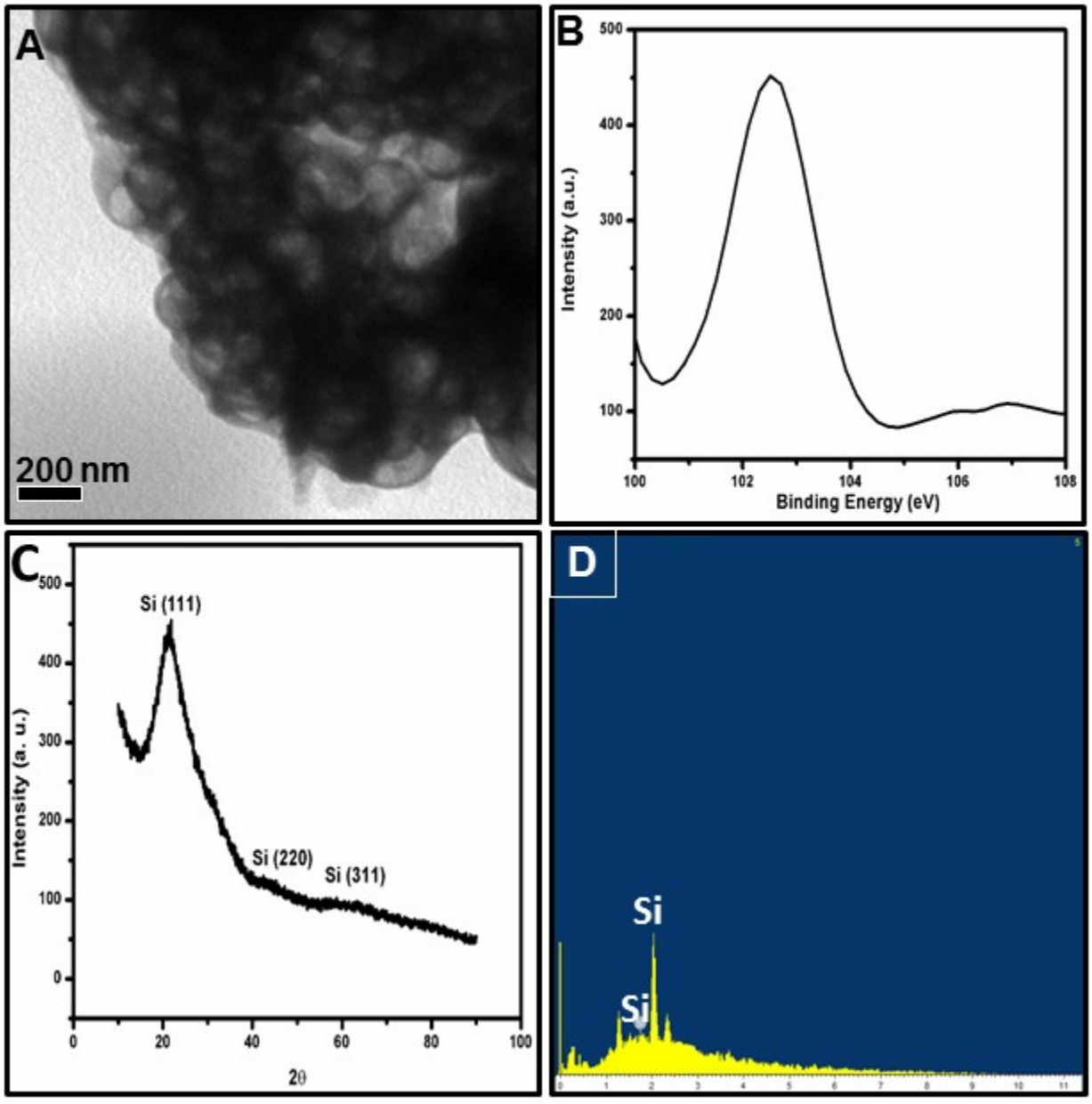

Figure S2. (A) TEM image, (B) XPS, (C) XRD and (D) EDX spectra of Si NSs.

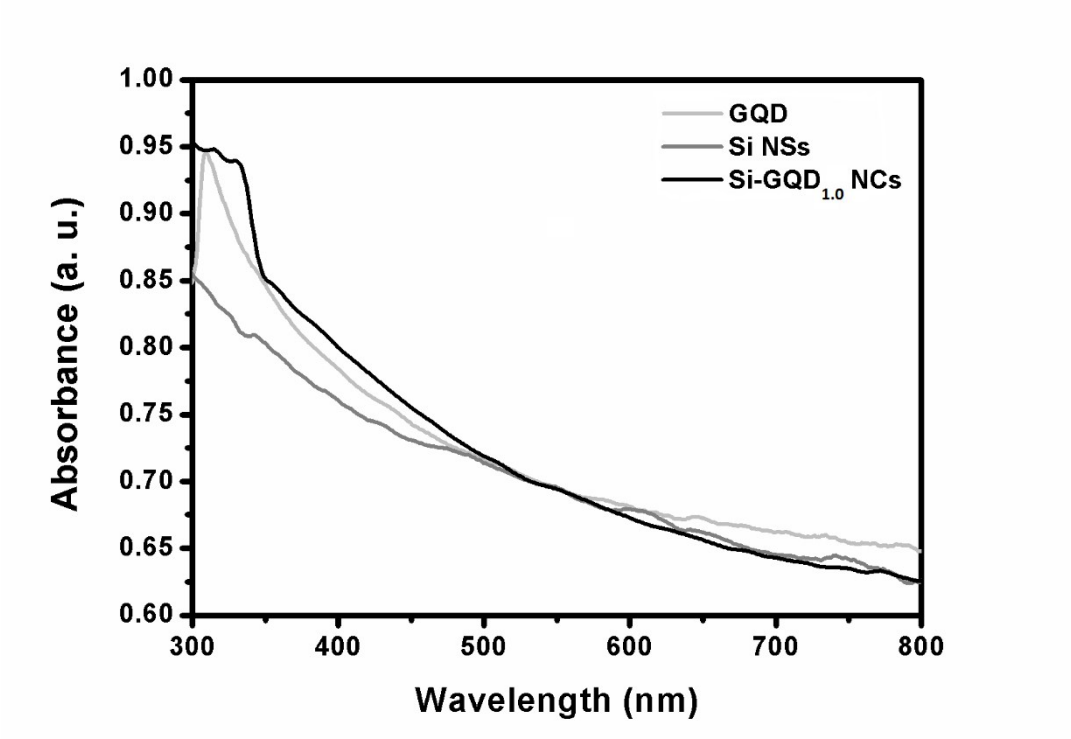

Figure S3. UV-vis absorption curves for Si NSs, GQD and Si-$GQD_{1.0}$ NCs.

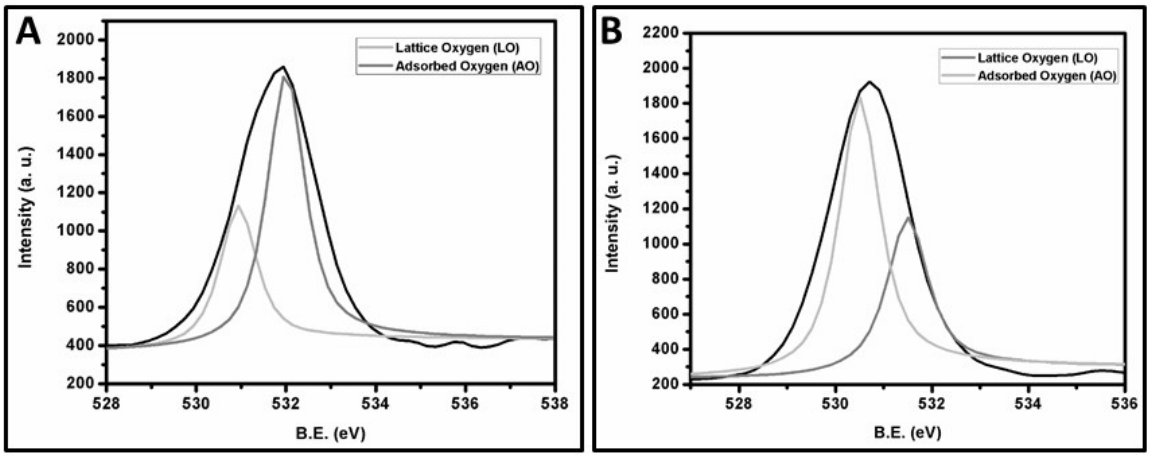

Figure S4. High resolution O1s XPS spectra of (A) GQDs and (B) Si-$GQD_{1.0}$ NCs.

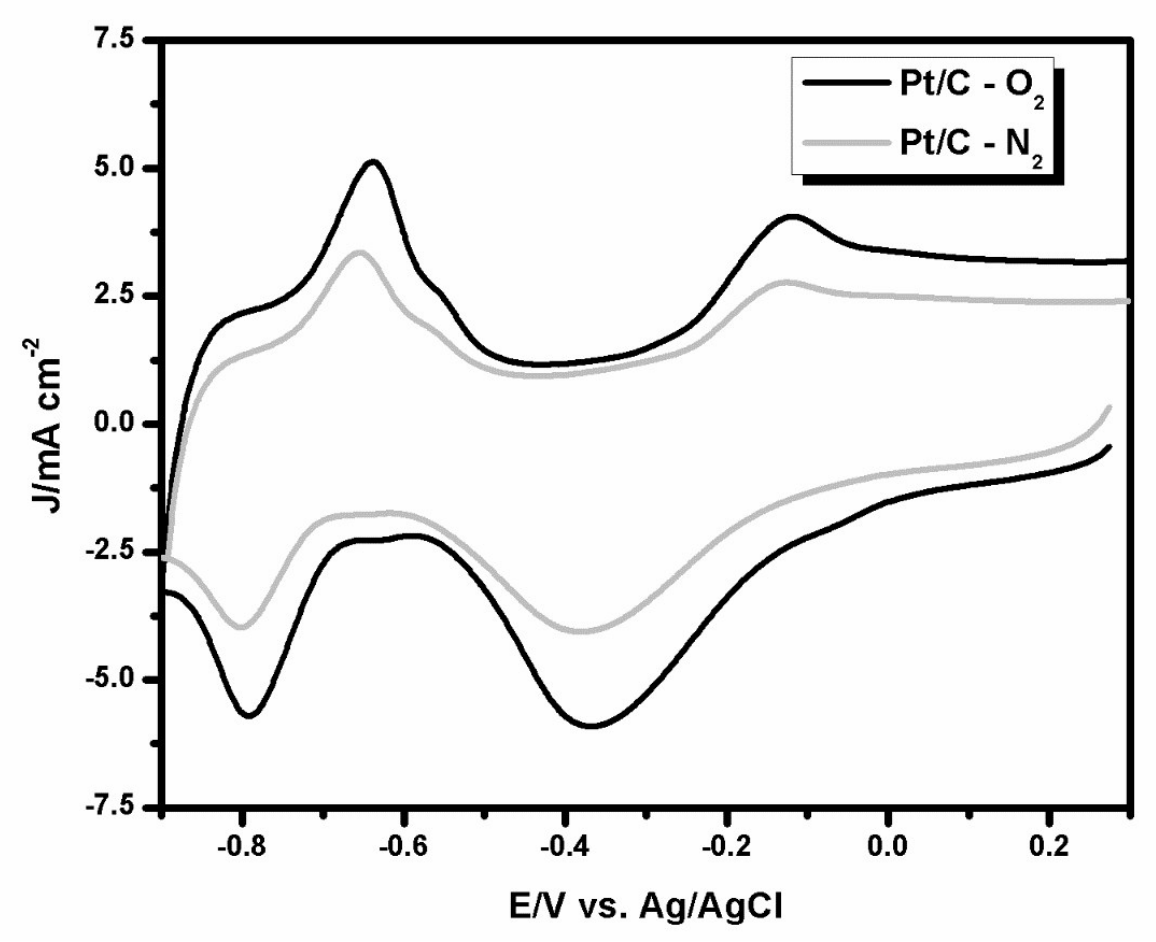

Figure S5. (A) CV curves of a Pt/C electrode in (a) N_2- and (b) O_2-saturated 0.1 M KOH at a scan rate of 20 mV s^{-1}. Current densities were normalized with respect to the geometric area (0.196 cm^2) of the RDE.

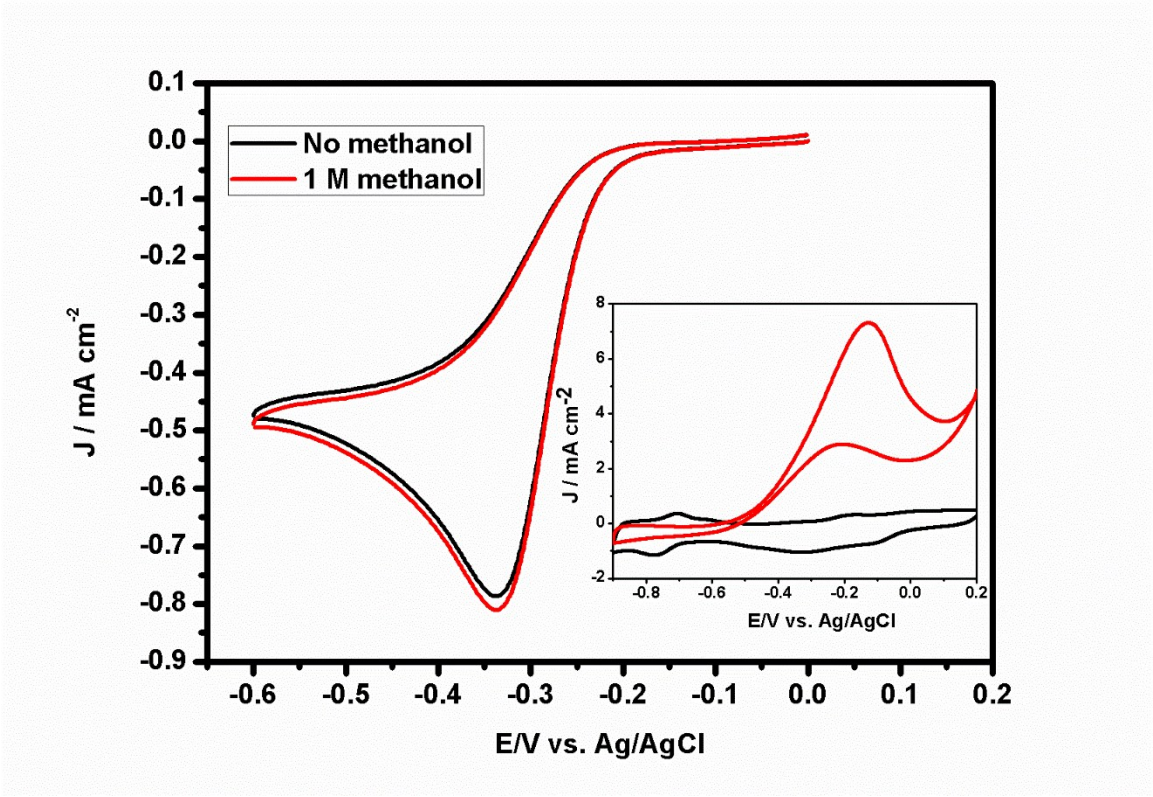

Figure S6. CV plots of the Si-GQD$_{1.0}$ NC electrode (Inset: Pt/C) in 0.1 M KOH in the absence and presence of 1 M MeOH. Scan rate: 20 mV s^{-1}.

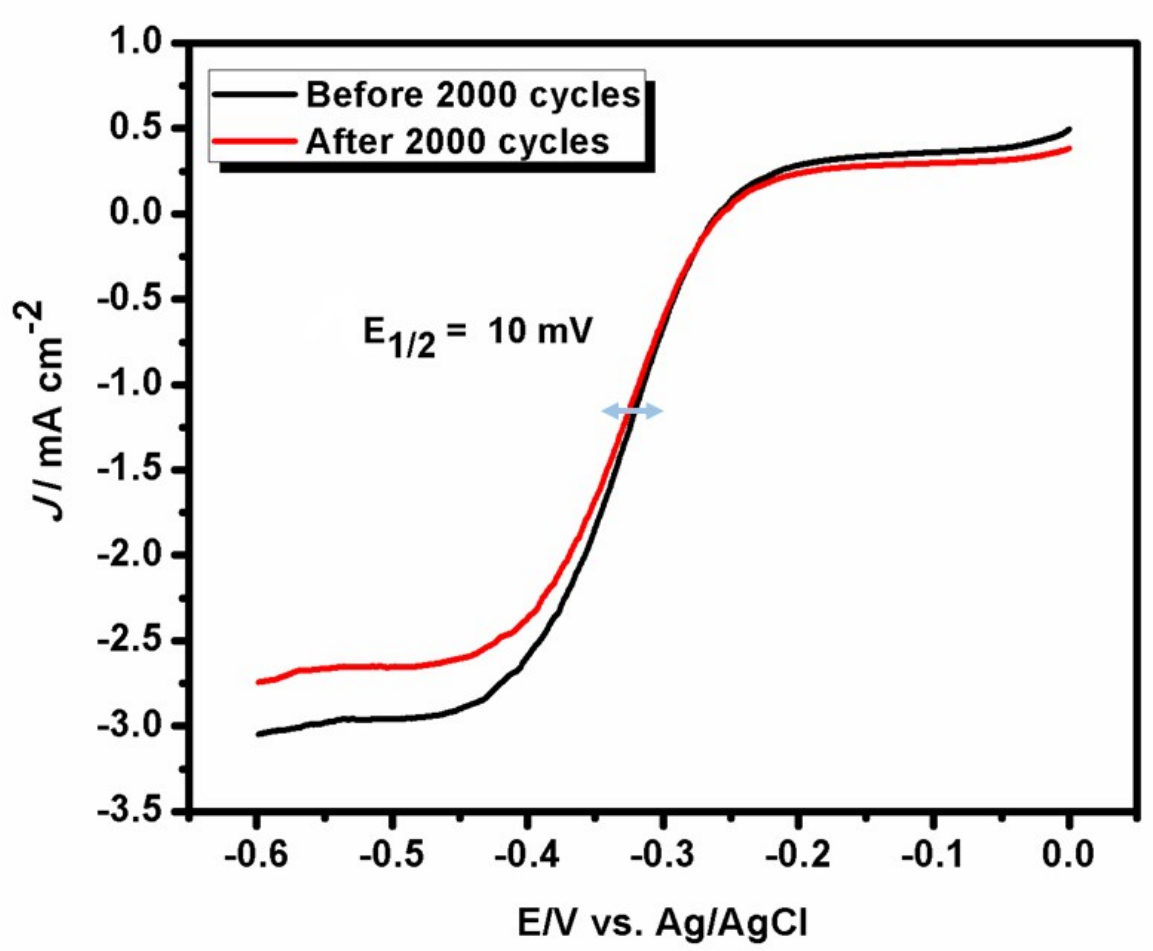

Figure S7. LSV polarization curves of Si-GQD NCs electrodes recorded before and after 2000 cycles of accelerated durability tests. Scan rate: 5 mV s^{-1}

Table S1. Elemental composition of rice husk before pyrolysis at 700 ºC for 2 h

Elements	Before Pyrolysis (wt%)
Si	81.2
C	12.2
Al	2.3
Fe	1.8
Na	0.7
Ca	0.4
K	0.5
Mg	0.3
P	0.6

Table S2. Comparison of ORR activity of carbon nanomaterials in alkaline media

Carbon nanomaterials	[a]E_{onset} (V)	[b]Peak potential (V)	Stability	Ref.
N-GQD/graphene	-0.16	-0.27	48 h	[1]
RN-GQDs-35/graphene	-0.19	-0.31	1000 cycles	[2]
N-doped colloidal GQDs	-0.1	[c]-0.3	[d]NA	[3]
N-doped carbon nanodots	-0.15	-0.35	1.9 h	[4]
N-doped mesoporous graphitic arrays	-0.13	-0.25	5.6 h	[5]
g-C_3N_4@CMK	-0.25	-0.3	45 h	[6]
Si-$GQD_{1.0}$ NCs	-0.18	-0.33	8.3 h, 2000 cycles	This work

[a,b] E vs. Ag/AgCl electrode, [c] E vs. SCE, [d]NA- not available

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