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Electronic Supplementary Information

Electrochemical Growth of Gold Nanostructures on Carbon Paper for Alkaline Direct Glucose Fuel Cell

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Table S1 Summary of growth conditions of Au electrodes.

Electrode	$HAuCl_4$ (mM)	CTAC (mM)	$NaNO_3$ (mM)	Voltage (V)	Temp (K)	Time (h)
Au NCs	5	10	20	1.8	290	18
Au NPs	5	15	-	1.8	290	18

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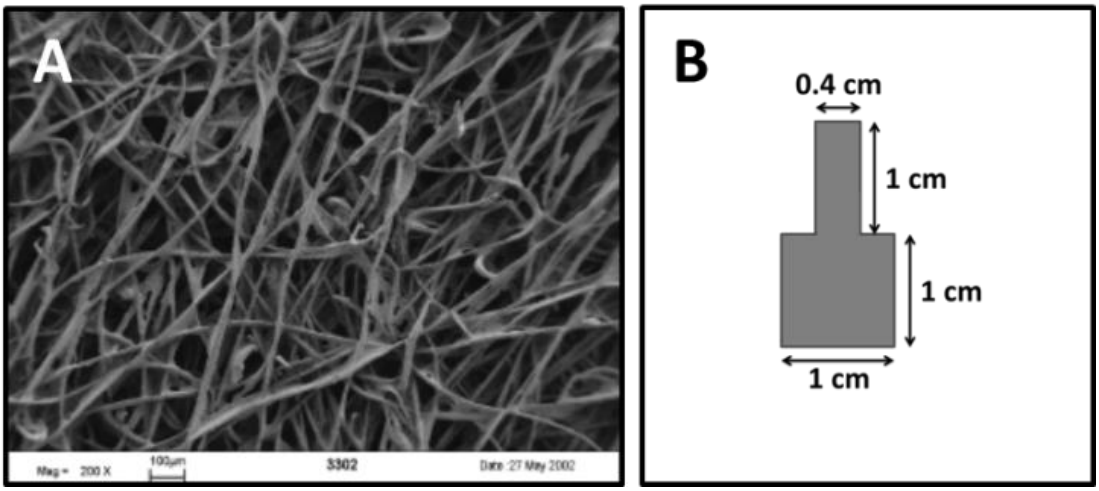

Figure S1 (A) SEM image of carbon paper composed of carbon fibers. (B) The designed geometric shape of the carbon paper showing 1×1 cm^2 area used for the growth of Au nanostructures as the anode.

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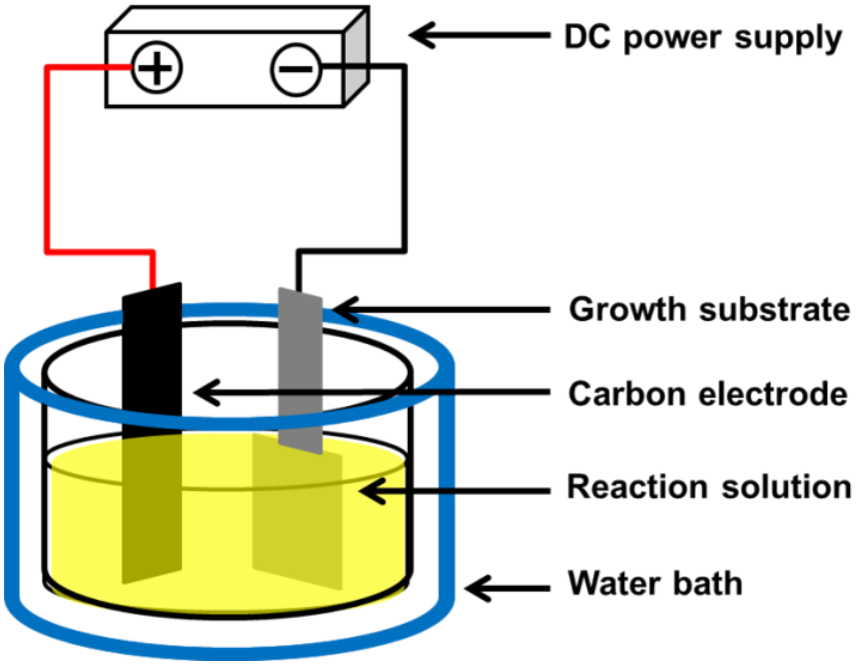

Figure S2 Diagram of two-electrode electrochemical deposition system.

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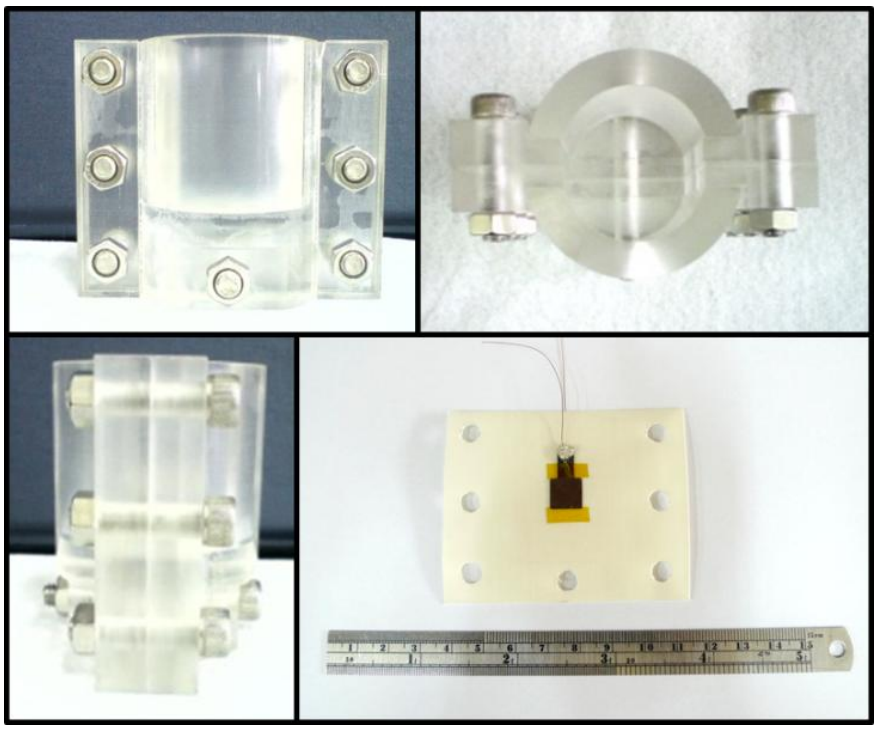

Figure S3 Photos of the cell.

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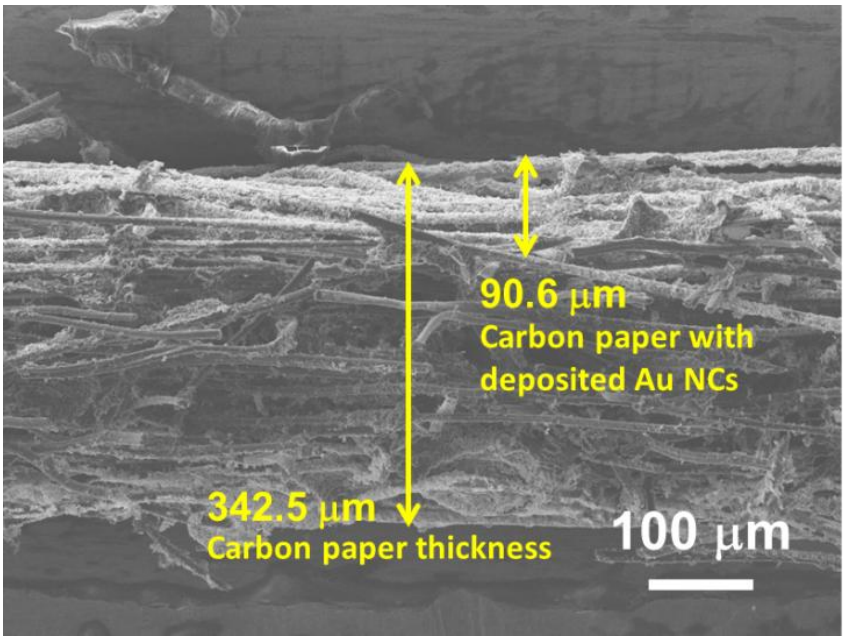

Figure S4 Cross-section SEM image of Au NCs on a carbon paper.

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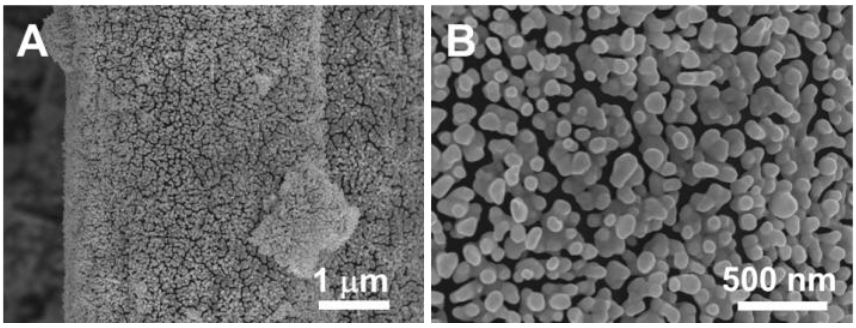

Figure S5 (A) Low- and (B) high-magnification SEM images of Au NPs on a carbon paper.

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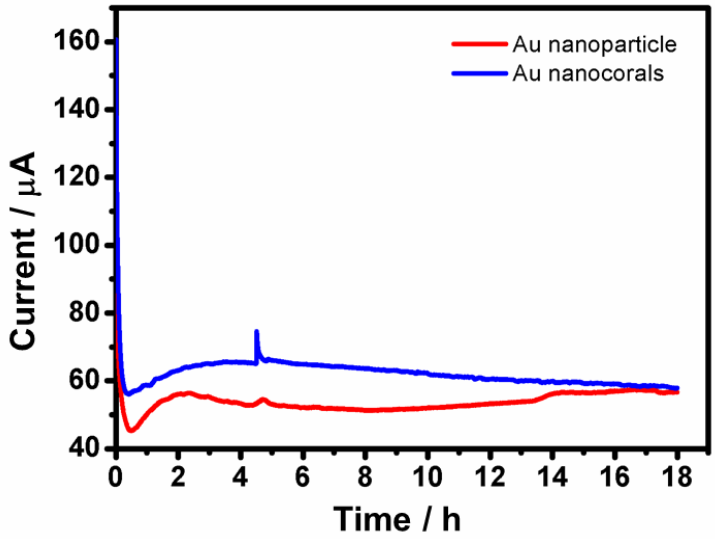

Figure S6 Reduction currents during the growth of Au NPs (red) and Au NCs (blue).

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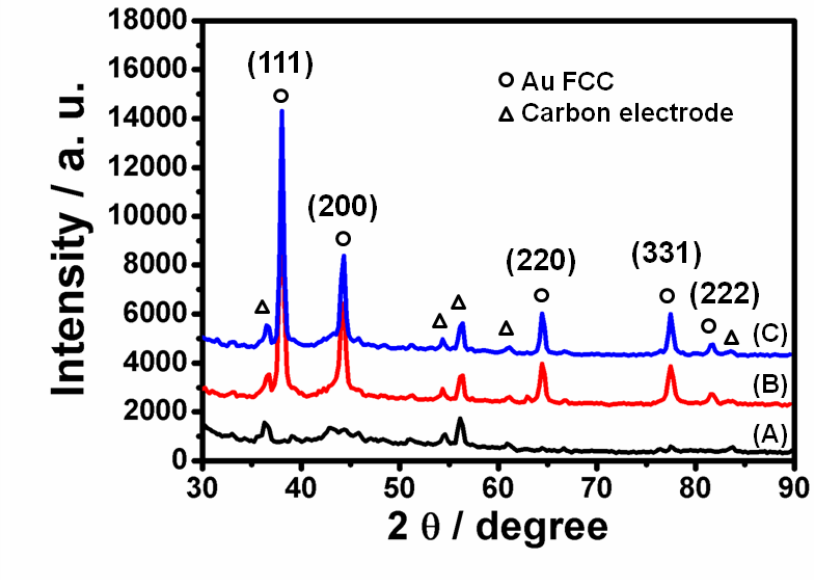

Figure S7 XRD patterns of (A) blank carbon paper, (B) Au NPs and (C) Au NCs on carbon paper.

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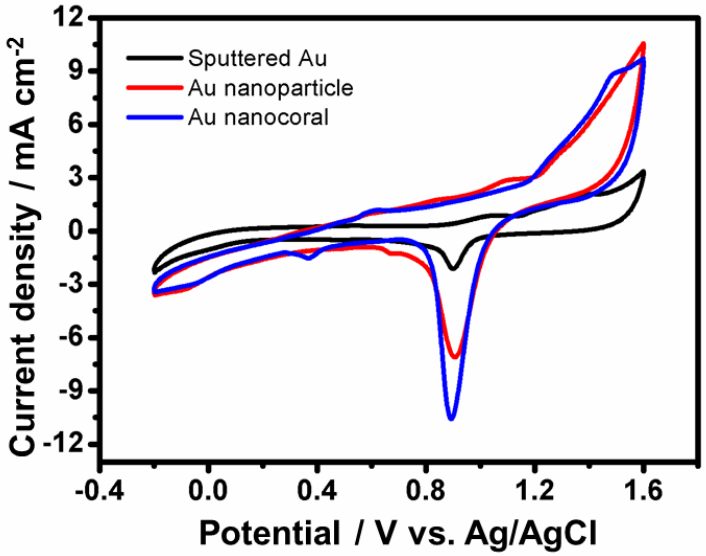

Figure S8 CV diagrams of Au electrodes (0.5 M H_2SO_4, scan rate, 100 mV/s).

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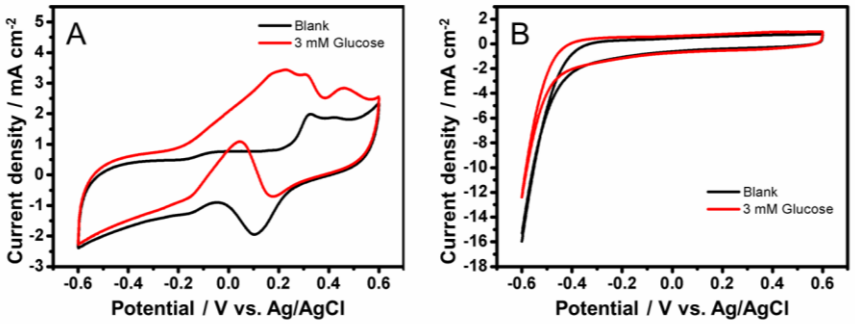

Figure S9 CV diagrams before (black) and after (red) additions of glucose (3mM) in (A) PBS (pH 7.4) and (B) H_2SO_4 (0.5 M), to Au NCs electrodes. Scan rate: 50 mV/s.

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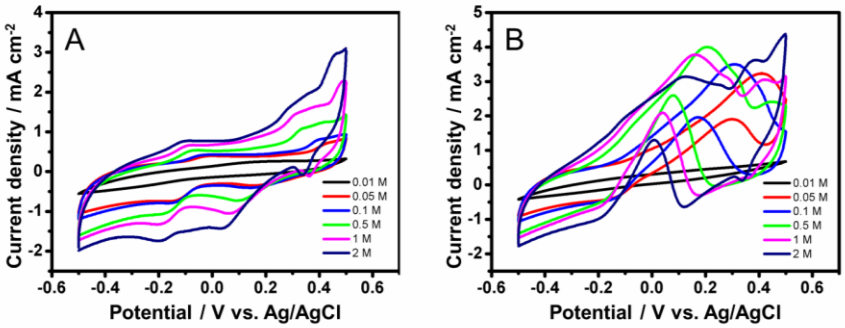

Figure S10 Comparison of electrocatalytic activities of an Au NCs electrode in KOH (0.01 - 2 M). (A) Before and (B) after additions of glucose (3mM). Scan rate: 50 mV/s.

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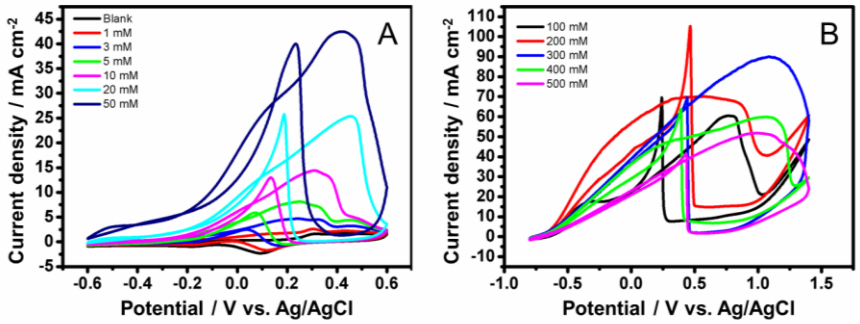

Figure S11 CVs of different glucose concentrations in KOH (0.5 M) using an Au NCs electrode. (A) 1 mM to 50 mM, (B) 100 mM to 500 mM. Scan rate: 50 mV/s.

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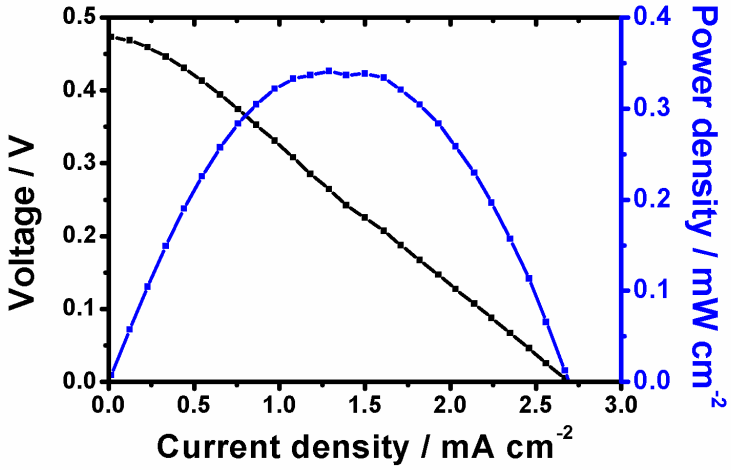

Figure S12 Plots of cell voltage and power density versus current density for a fuel cell using Nafion membrane as the ion-conducting material.

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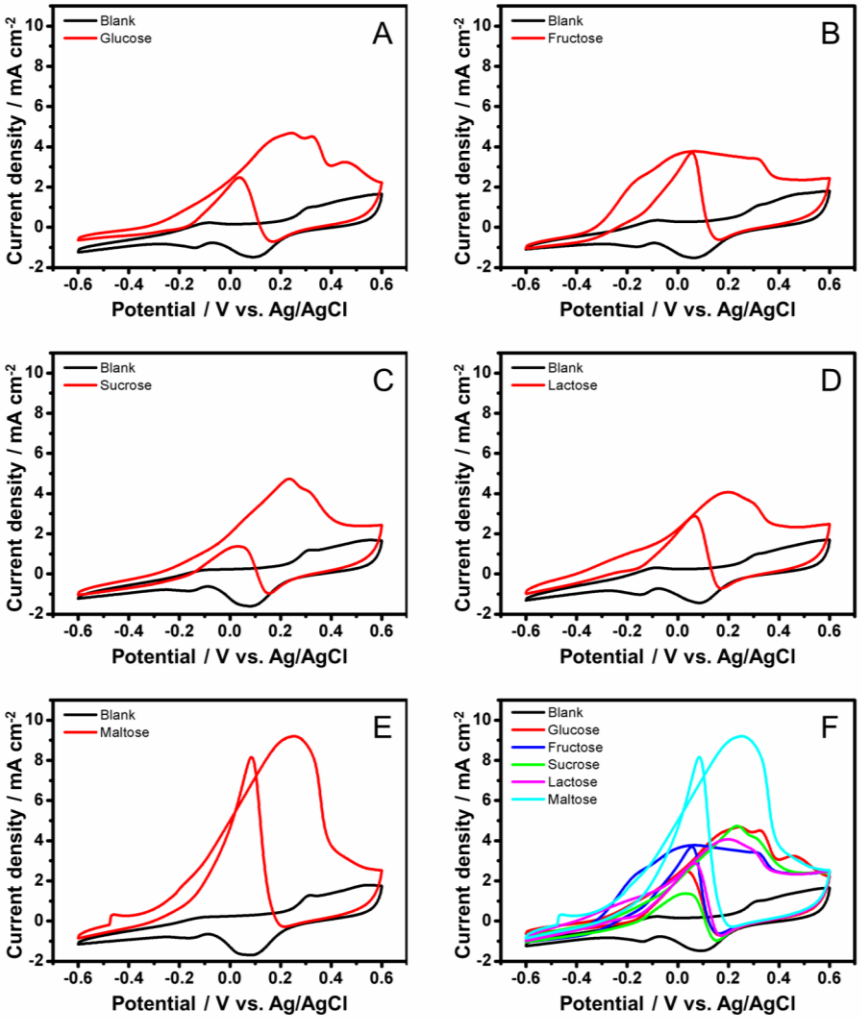

Figure S13 Electrocatalytic activities of different saccharides. (A) glucose, (B) fructose, (C) sucrose, (D) lactose and (E) maltose, before (black) and after (red) additions of the corresponding saccharides (3mM) on Au NCs electrode in KOH (0.5 M). (F) Comparison of the current responses of the saccharides. Scan rate: 50 mV/s.

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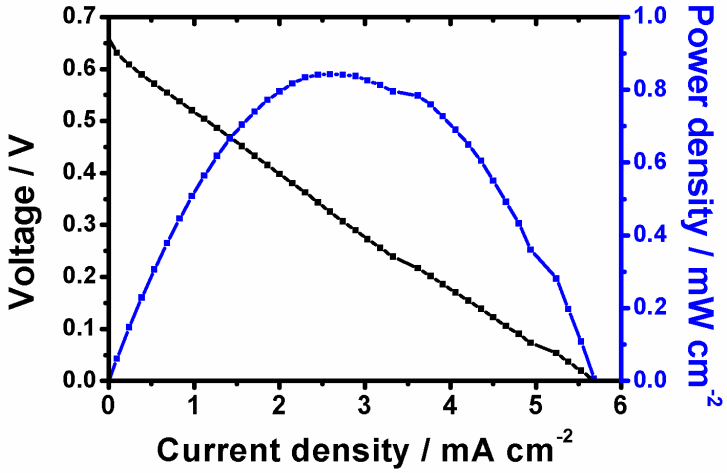

Figure S14 Plots of cell voltage and power density versus current density for a cell using maltose as the fuel and Au NCs electrode as the anode.