Supplementary Material

Enhanced electrochemical glucose sensing of Co/Cu-MOF by hydroxyl adsorption induced reactive oxygen species

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Summary of Content

Section S.1 Material, Instruments and Measurgin method

Materials

Glucose was from Sinopharm Chemical Reagents, China. Dimethyl imidazole, Dopamine hydrochloride, uric acid, melamine and sucrose were from Macklin Reagent, China., Copper nitrate trihydrate was from Damao Chemical Reagent Factory, China., Nitric acid was from Yantai Yuandong Fine Chemicals Co, Ltd, Copper chloride dihydrate, sodium hydroxide and Potassium chloride were from Tianjin Hengxing Chemical Reagent Manufacturing Co, Ltd, dopamine, Carbon paper was from Shanghai Hesen Electric Co., LTD. All water is deionized and all of the materials used in experiment were analytical grade and used without further purification.

Instruments

Scanning electron microscopy (SEM; Zeiss Sigma 300) and transmission electron microscopy (TEM; on HITACHI HT-7700) images were used for morphological and structural tests. X-ray photoelectron spectroscopy (XPS; Thermo Scientific) and powder X-ray diffraction (XRD; Ultima IV, Science) were used for component, composition tests.

Measurgin method

For ORR, CV measurements were tested after purging N_2 gas for 30 min in the potential range from -0.8 to 0.2 V (*v.s.* Ag/AgCl). The RRDE tests for ORR were performed in 0.1 M NaOH solution at 1600 rpm with a scan rate of 20 mV s^{-1} and a potential range of -0.8 ~ 0.2 V (*v.s.* Ag/AgCl). For I-T, the standard addition method was used to determine glucose in 0.1 M NaOH solution.

Section S.2 Characterizations and measurements

Scanning electron microscopy (SEM; Zeiss Sigma 300) and transmission electron microscopy (TEM; HITACHI HT-7700) images were tested for the morphologies and structures. X-ray photoelectron spectroscopy (XPS; Thermo Scientific) and powder X-ray diffraction (XRD; Ultima IV, Neo-Confucianism) were carried for the composition and crystalline information.

Electrochemical measurements were tested on the CHI 760E using three-electrode system with a working electrode, a Pt wire as the counter electrode and an Ag/AgCl electrode as the reference electrode, respectively. All potentials refer to RHE, ERHE = E_{AgCl} + 0.059 × pH + 0.197 V. RDE with Pt disk electrode (5 mm in diameter), rotating ring-disk electrode with a Pt ring (5 mm inner diameter and 7 mm outerdiameter) and GC disk (4 mm diameter) are used as the substrate for the working electrodes. 10 mg of catalyst, 5 μL of 5 wt% Nafion and 1mL ethanol, ultrasonication for 30 min and forming a homogeneous ink. Subsequently, 15 μL of the catalyst ink was pipetted on the working electrode and dried at room temperature. For OER, LSV was measured in N_2-saturated 0.1 M NaOH solution with a scanning rate of 10 mV s^{-1} in the potential range from 0 to 0.9 V versus Ag/AgCl electrode. For ORR, CV measurements were tested after purging N_2 gas for 30 min in the potential range from -0.8 to 0.2 V versus Ag/AgCl electrode. RDE and RRDE tests for ORR were measured in O_2-saturated 0.1 M NaOH solution at rotation speeds from 100 to 2500 rpm with a scanning rate of 20 mV s^{-1} in the potential range from -0.8 to 0.2 V versus Ag/AgCl electrode. For IT, the standard addition technique was used for the determination of glucose.

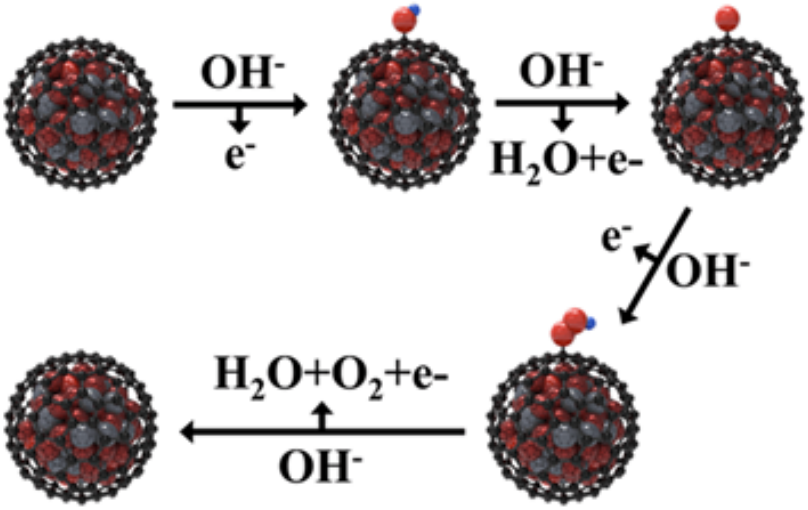

Fig. S1 Schematic diagram of hydroxyl adsorption to produce reactive oxygen species.

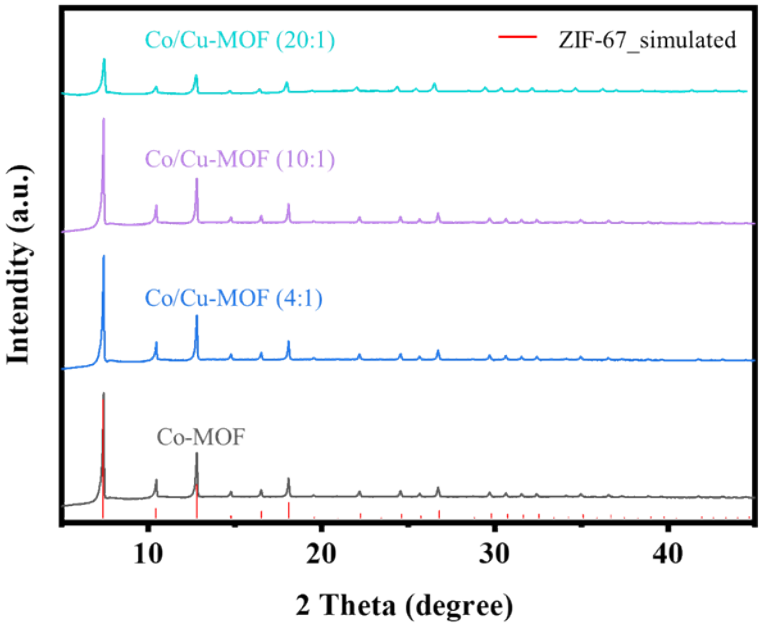

Fig. S2 XRD of the Co/Cu-MOF (20:1), Co/Cu-MOF (10:1), Co/Cu-MOF (4:1) and Cu-MOF.

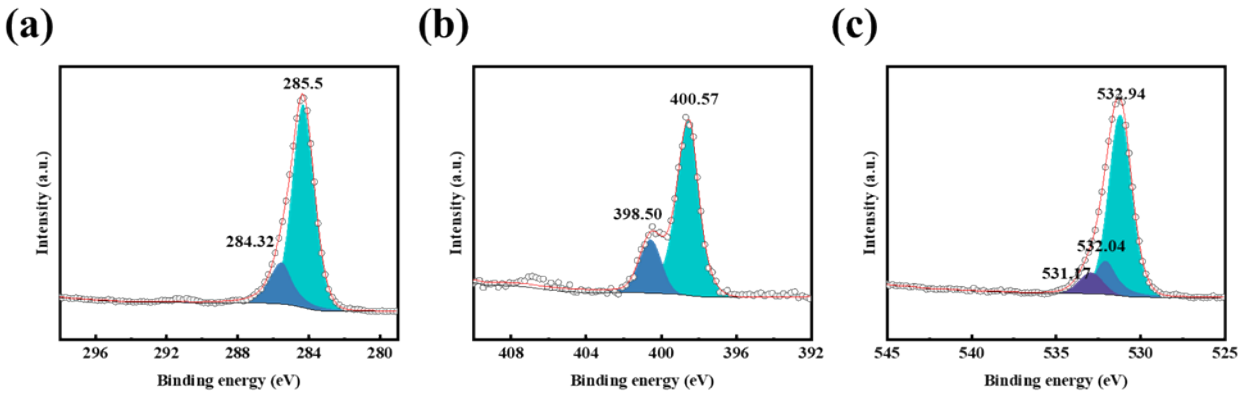

Fig. S3 (a-c) C, N and O high resolution XPS of the Co/Cu-MOF (20:1).

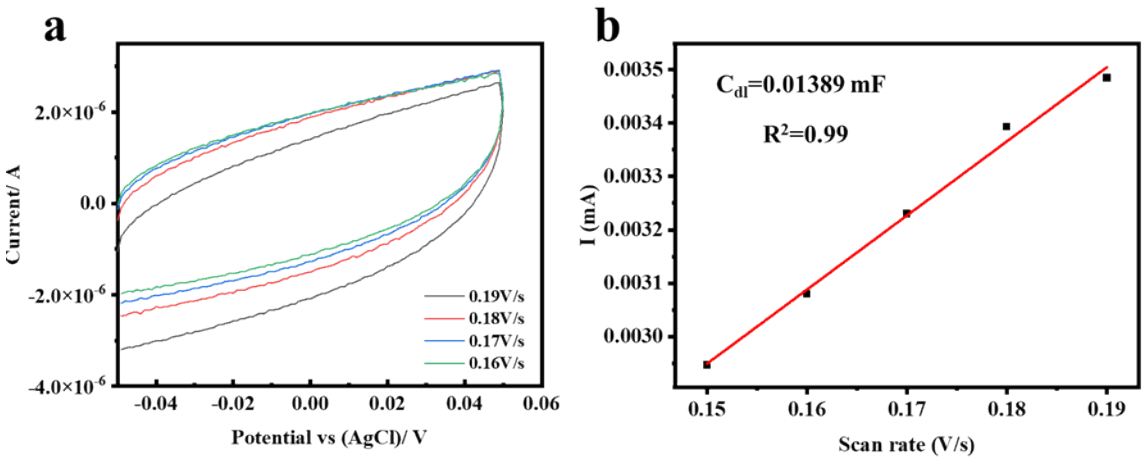

Fig. S4 The ECSA of the Co/Cu-MOF (20:1).