Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Supporting Information

Plasma Synthesis of Carbon Nanotube-Gold Nanohybrids: An Efficient Catalyst for Green Oxidation of Silanes in Water

Ting Liu, Fan Yang, Yongfeng Li,* Liang Ren, Liqiang Zhang, Kai Xu, Xian Wang, Chunming Xu, and Jinsen Gao

State Key Laboratory of Heavy Oil Processing, China University of Petroleum, Changping, Beijing 102249, China. Phone/Fax: +86-010-89739028. E-mail: yfli@cup.edu.cn

1. Materials

All chemicals were used as received without further purification: Hydrogen tetrachloroaurate (III) tetrahydrate, 1-Butyl-3-methylimidazolium tetrafluoroborate ([BMIM]BF_4), Phenyldimethylsilane, Triisopropylsilane, (Aladdin industrial corporation). oleylamine, polyvinylpyrrolidone-K30 (PVP-K30), (Tokyo Chemical Co., Ltd > 40%). Triethylsilane, Triphenylsilane, Diphenylsilane, Chloroform-d, 1-dodecanethiol (J&K Scientific Co., Ltd). Ethanol, methylene chloride (CH_2Cl_2), Acetone, acetic ether, tetrahydrofuran, toluene, N,N-Dimethylformamide (DMF), (Beijing chemical works).

2. Experimental setup

Figure S1 shows the experimental setup of the gas-liquid interfacial plasma. The glow discharge plasma was generated between the top flat stainless steel (SUS) and bottom ionic liquid electrode by using a DC power source (KIKUSUI PMC500-0.1A). Ar gas was introduced and used as the plasma-forming gas. The chamber was a stainless steel with inner diameter of 70 mm and four glass windows, and the gap between electrodes is 4mm.

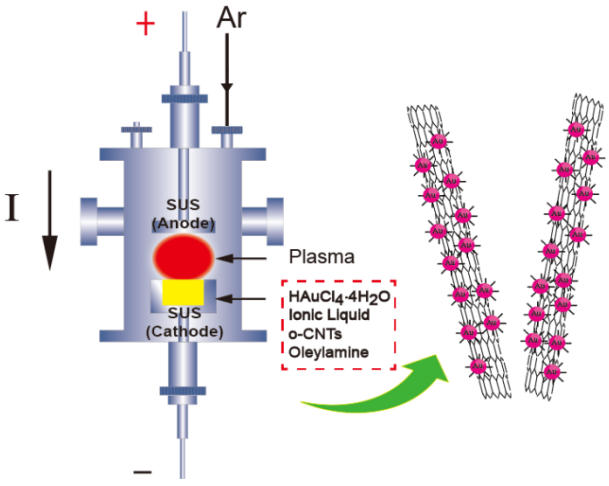

Figure S1. A schematic illustration of plasma system

3. The result of typical optical emission spectra (OES) during the gas plasma region

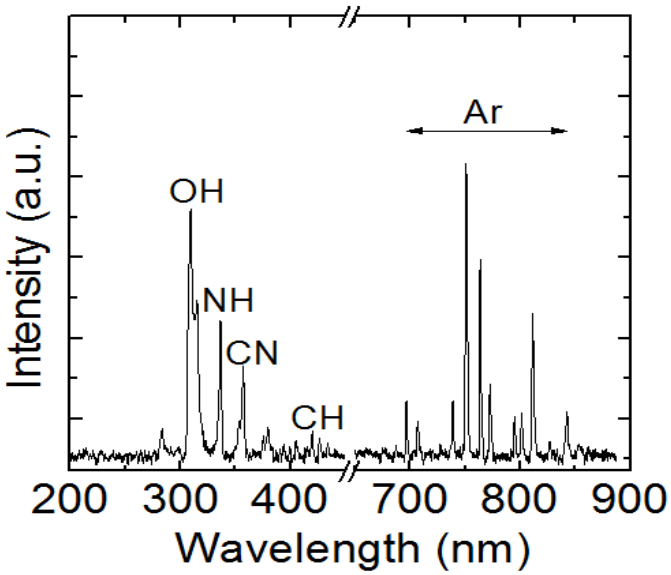

Figure S2. OES analysis of the gas-liquid interfacial plasma

4. The TEM images of AuNPs decorated on the surface of o-CNTs

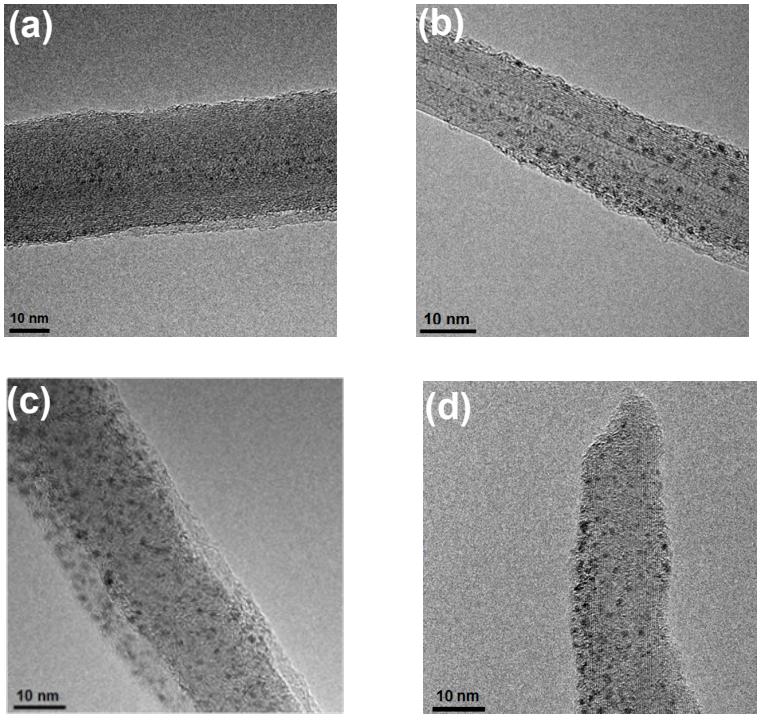

Figure S3. TEM images of Au-1 (a), Au-2 (b), Au-3 (c), Au-4 (d), corresponding to AuNPs decorated o-CNTs prepared with different Au weight ratios (4.8 %, 7.7 %, 13.1 %, 15.2%)

5. The size distribution of AuNPs decorated on the surface of o-CNTs

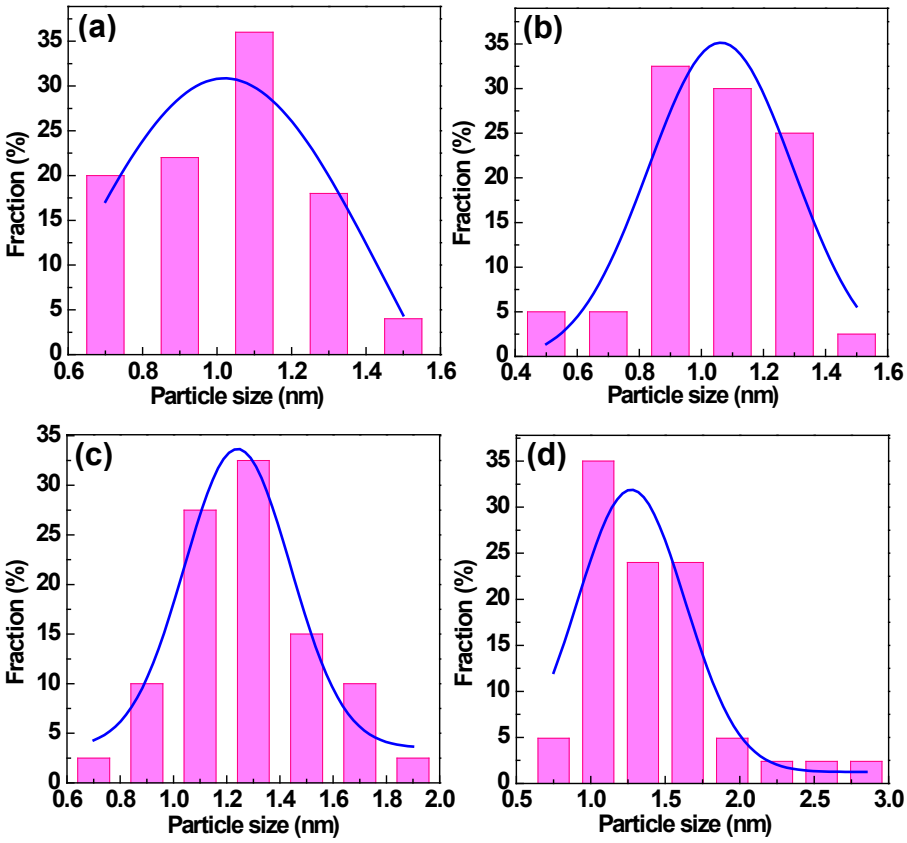

Figure S4. Particle size distribution of Au-1 (a), Au-2 (b), Au-3 (c), Au-4 (d) from the TEM images in Fig. S3.

6. Energy dispersive X-ray spectroscopy (EDX) of Au-2 catalyst

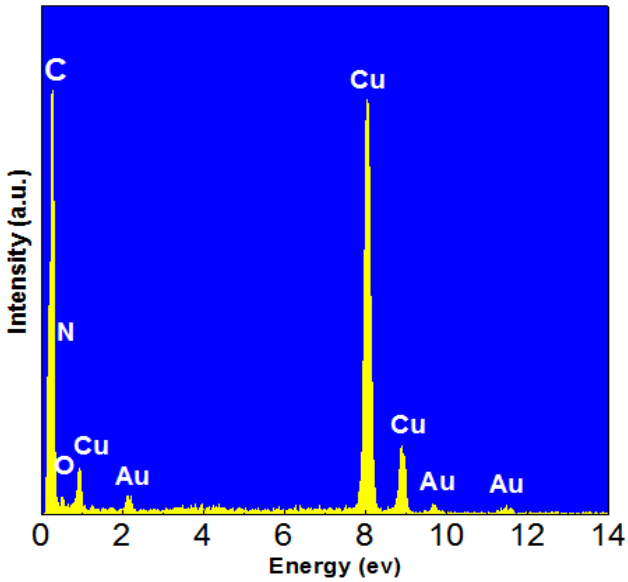

Figure S5. A EDX spectrum of Au-2 catalyst

7. Energy dispersive X-ray spectroscopy (XPS) of Au-2 catalyst

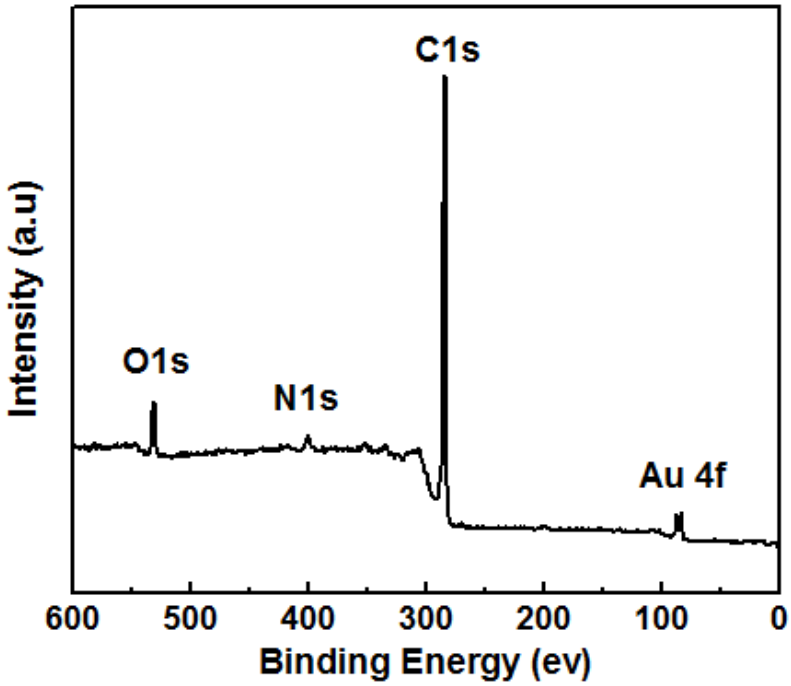

Figure S6. A XPS spectrum of Au-2 catalyst

8. The TEM images of the reused Au-2 catalyst

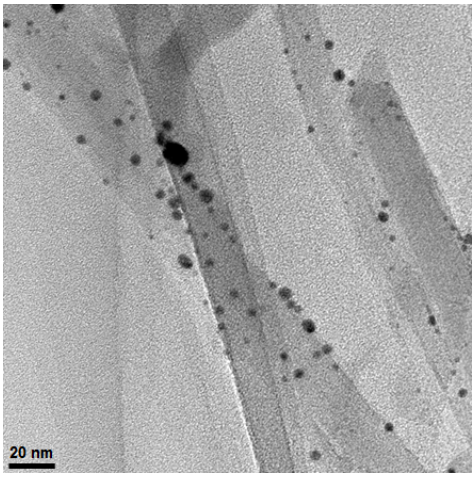

Figure S7. A TEM image of Au-2 catalyst after using repeatedly for 4 times

Table S1. Au loading on o-CNTs (wt. %) [a] and AuNPs size (nm) [b]

Sample	Au-1	Au-2	Au-3	Au-4
Au loading wt.%	4.8	7.7	13.3	15.2
AuNPs size (nm)	1.0	1.1	1.2	1.5

[a] Calculated by ICP

[b] Average size obtained from the size distribution histogram