Electronic Supplementary Information (ESI)

# General synthesis of carbon nanocages and their adsorption of toxic compounds from cigarette smoke

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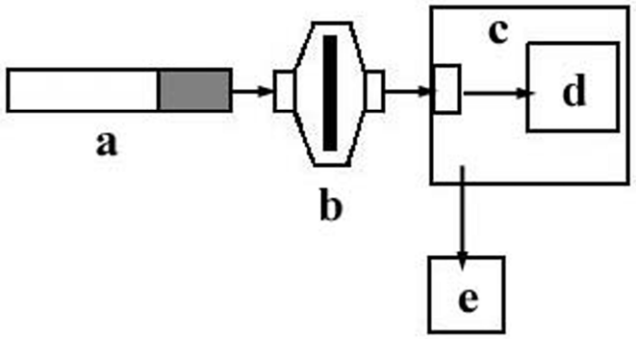


**Fig. S1** Schematic of experimental system. (a) cigarette, (b) Cambridge filter pad, (c) smoking machine, (d) gas collector, (e) computer control system.

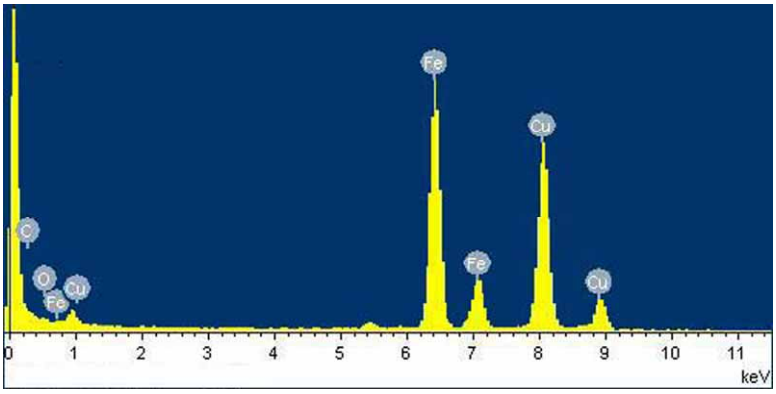


**Fig. S2** EDS from the $Fe_3O_4$/C composites. The result of EDS indicates that the chemical compositions of the samples are C, Fe and O. The peaks of Cu signals in the spectrum originate from the copper grid that supports the specimen.

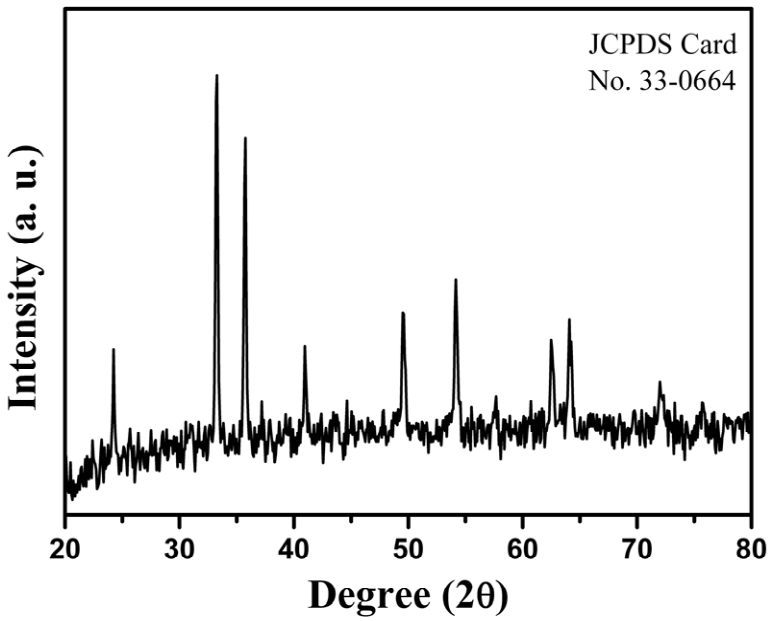


**Fig. S3** XRD pattern of the $Fe_3O_4$/CNCs calcined at 600 ℃ for 10 h.

**Table S1** Comparison of the different CNCs in previous reports.

| References | Synthesis method | Temperature (℃) | Length of the side (nm) | Wall thickness (nm) |
|---|---|---|---|---|
| [9] | In suit template approach | 600~900 | 30~50 | ~5 |
| [11] | Arc evaporation method | | 20~100 | ~10 |
| [13] | Template (gold) method | | 20~50 | ~5 |
| [16] | Solvethermal reaction | 500~700 | 10~100 | ~5 |
| This work | Pyrolytic process | 550 | 200~350 | 10~15 |

[9] J. N. Wang, L. Zhang, J. J. Niu, F. Yu, Z. M. Sheng and Y. Z. Zhao, *Chem. Mater.*, 2007, **19**, 453.

[11] Y. Saito and T. Matsumoto, *Nature*, 1998, **392**, 237.

[13] R. Y. Zhang, M. Hummelgard and H. Olin, *Carbon*, 2010, **48**, 424.

[16] J. Liu, L. Xu, W. Zhang, W. Lin, X. Chen, Z. Wang and Y. Qian, *J. Phys. Chem. B*, 2004, **108**, 20090.

**Table S2** Fe/C ratios obtained by adjust the quantity of the alcohols.

| Alcohols | Volume (ml) | $Fe_3O_4$/C (g) | $Fe_2O_3$ (g) | $Fe_3O_4$ (g) | $Fe_3O_4$ (%) | C (g) | C (%) | Fe/C (mol) |
|---|---|---|---|---|---|---|---|---|
| Ethanol | 12 | 0.1677 | 0.1471 | 0.1422 | 84.8 | 0.0255 | 15.2 | 0.87 |
| | 14 | 0.1478 | 0.1234 | 0.1193 | 80.7 | 0.0285 | 19.3 | 0.65 |
| | 16 | 0.1673 | 0.1345 | 0.1300 | 77.7 | 0.0373 | 22.3 | 0.54 |
| EG | 12 | 0.1503 | 0.1270 | 0.1228 | 81.7 | 0.0275 | 18.3 | 0.69 |
| | 14 | 0.1584 | 0.1285 | 0.1242 | 78.4 | 0.0342 | 21.6 | 0.56 |
| | 16 | 0.1549 | 0.1182 | 0.1143 | 73.8 | 0.0406 | 26.2 | 0.44 |
| PEG-400 | 12 | 0.1500 | 0.1322 | 0.1278 | 85.2 | 0.0222 | 14.8 | 0.89 |
| | 14 | 0.1517 | 0.1244 | 0.1203 | 79.3 | 0.0314 | 20.7 | 0.59 |
| | 16 | 0.1634 | 0.1297 | 0.1254 | 76.7 | 0.0380 | 23.3 | 0.51 |