Supplementary Information

Novel hollow sphere bismuth doped mesoporous carbon nanocomposite material derived from sustainable biomass for picomolar electrochemical detection of Lead and Cadmium

Kemal M. Zeinu[#], Huijie Hou[#], Bingchuan Liu, Xiqing Yuan, Long Huang, Xiaolei Zhu, Jingping Hu*, Jiakuan Yang*, Sha Liang, Xu Wu

School of Environmental Science and Engineering, Huazhong University of Science and Technology (HUST), Wuhan, China

# These two authors contribute equally to this paper.

*Corresponding authors:

Prof. Jingping Hu, E-mail: hujp@hust.edu.cn, Tel: +86-27-87793948;

Prof. Jiakuan Yang, E-mail: jkyang@ hust.edu.cn, Tel: +86-27-87793948; Fax: +86-27-87792101

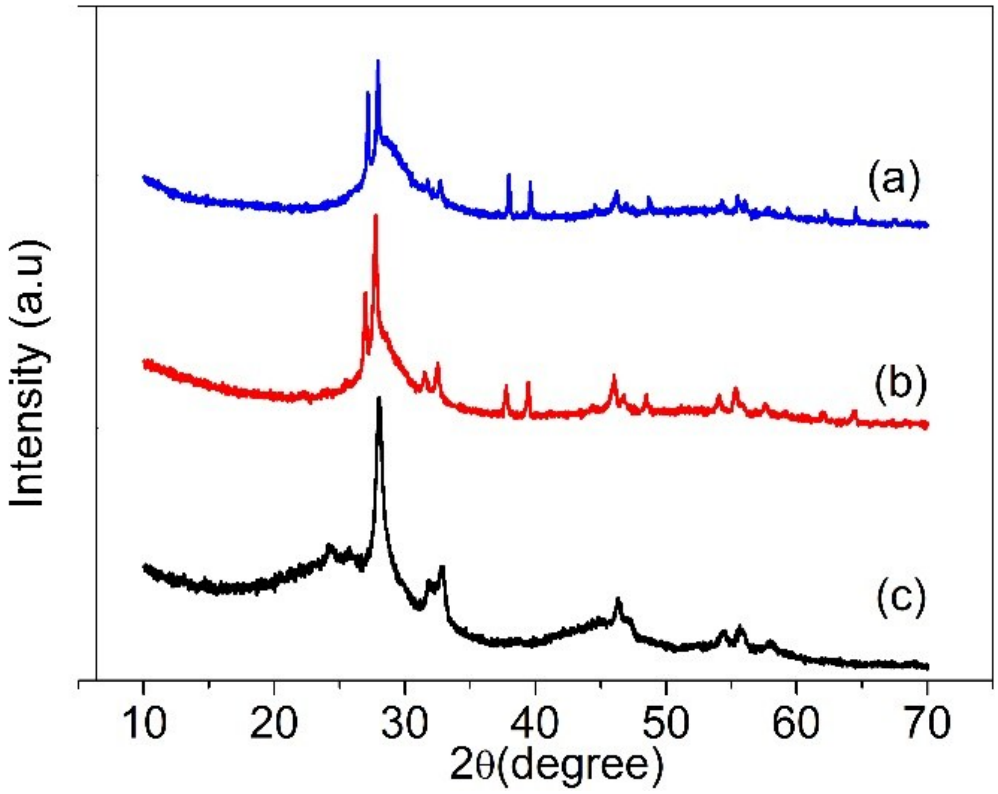

Fig. S1 XRD bismuth doped porous carbon composite material carbonized in N_2 environment for 2 hours at 900 °C of a) 1 M Bi/PC, b) 0.5 M Bi/PC, and c) 0.05 M Bi/PC.

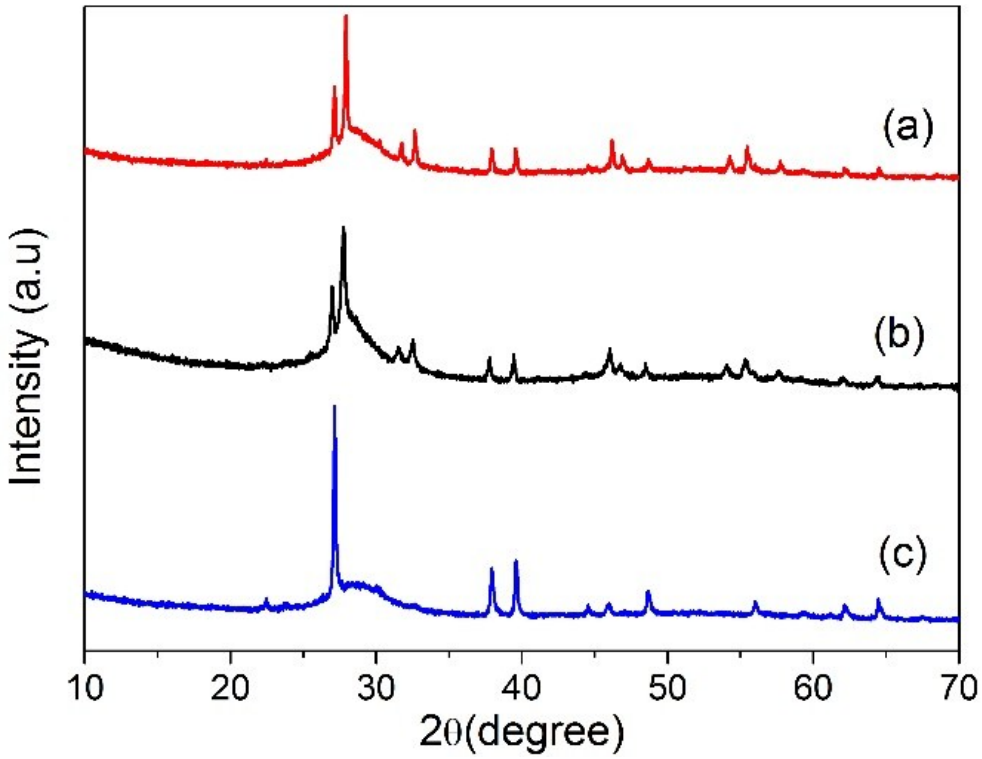

Fig. S2 XRD 0.5 M Bi/PC composite material carbonized in N_2 environment for 2 hours at a) 900 °C, b) 700 °C, and c) 500 °C.

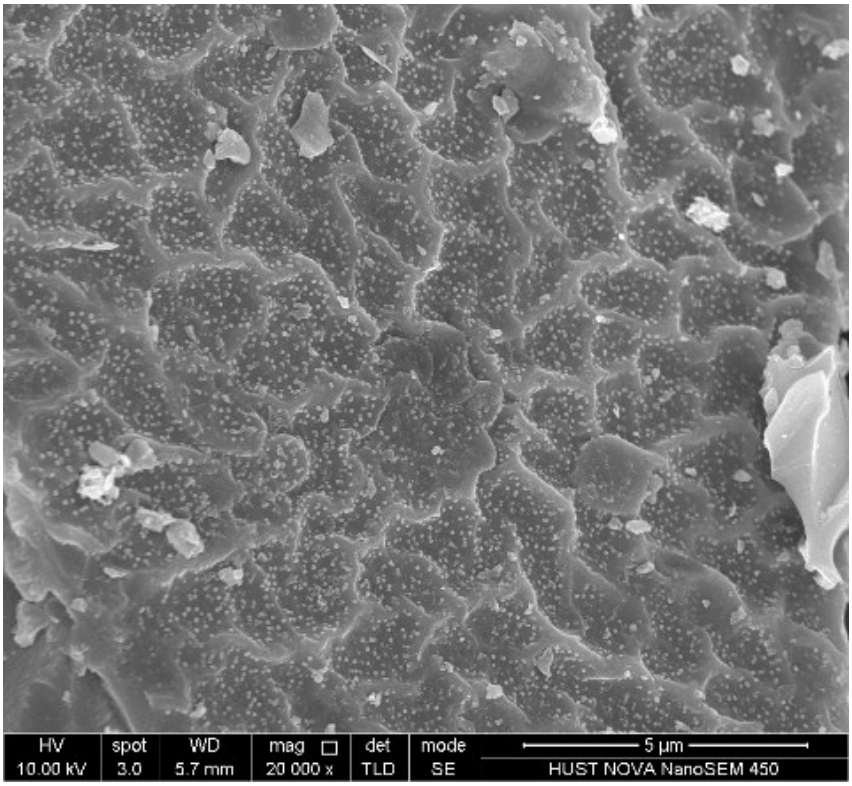

Fig. S3 SEM micrograph of 0.5M Bi/PC composite material carbonized in N_2 environment for 2 hours at 900 °C showing a uniform distribution of bismuth particles on the carbon surface.

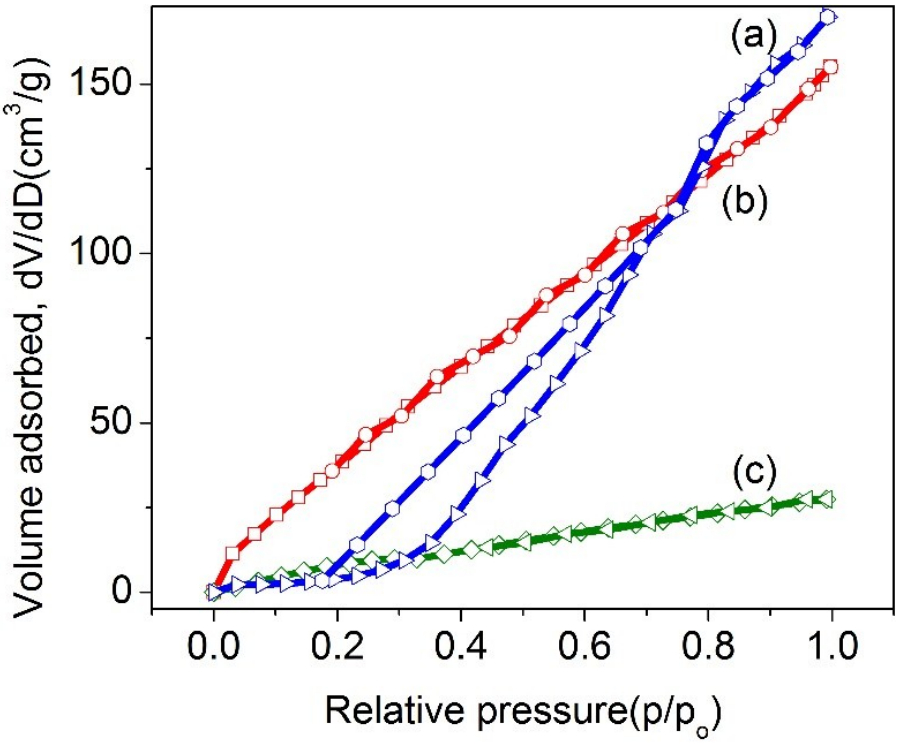

Fig. S4 Specific surface area of the different composite material carbonized at 900 °C in N_2 environment for 2 hours containing a) 0.05 M Bi/PC, b) 0.5 M Bi/PC, and c) 1 M Bi/PC.

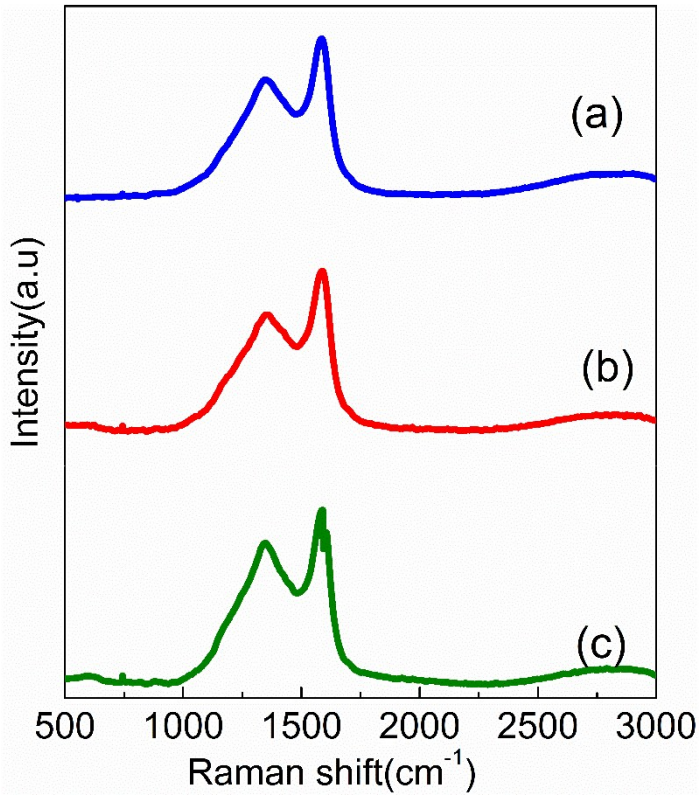

Fig. S5 Raman Spectra of the composite material carbonized at 900 °C in N_2 environment for 2 hours a) 0.05 M Bi/PC, b) 0.5 M Bi/PC, and c) 1 M Bi/PC.

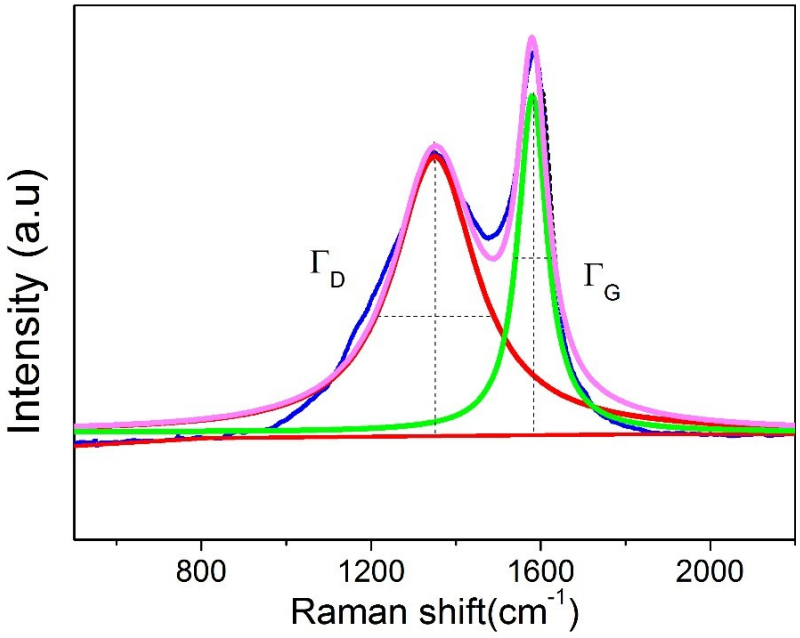

Fig. S6 Lorentzian peak fitting of the Raman spectra obtained for 0.5 M Bi/PC composite material carbonized at 900 °C in N_2 environment for 2 hours.

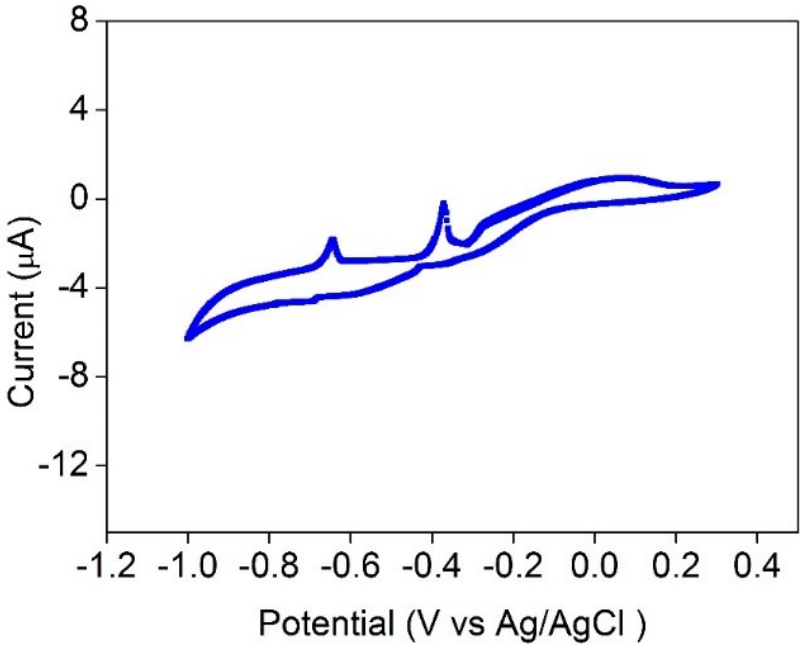

Fig. S7 CV obtained at 0.5 M Bi/PC/Ch composite material carbonized at 900 °C modified GCE in 0.1 M acetate buffer , pH 4.5, at 50 pM of each Pb^{2+} and Cd^{2+} solution, scan rate of 50 mV in the presence of 0.1 M KCl, scan from −1 V to 0.3 V.

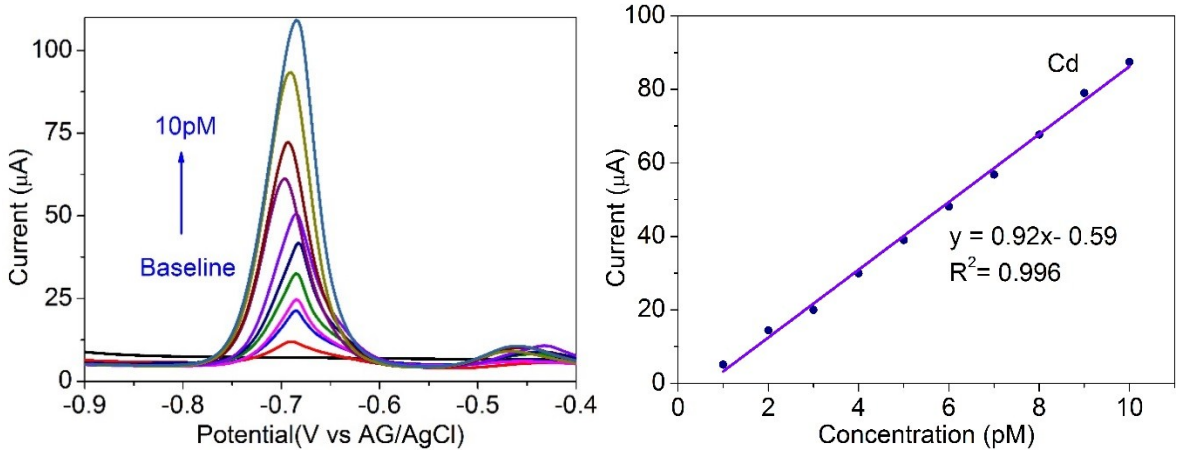

Fig. S8 Square wave anodic stripping voltammetry (left) and corresponding calibration plot (right) for individual analysis Cd^{2+} obtained at 0.5 M Bi/PC/Ch modified GCE baseline to 10 pM Cd^{2+}.

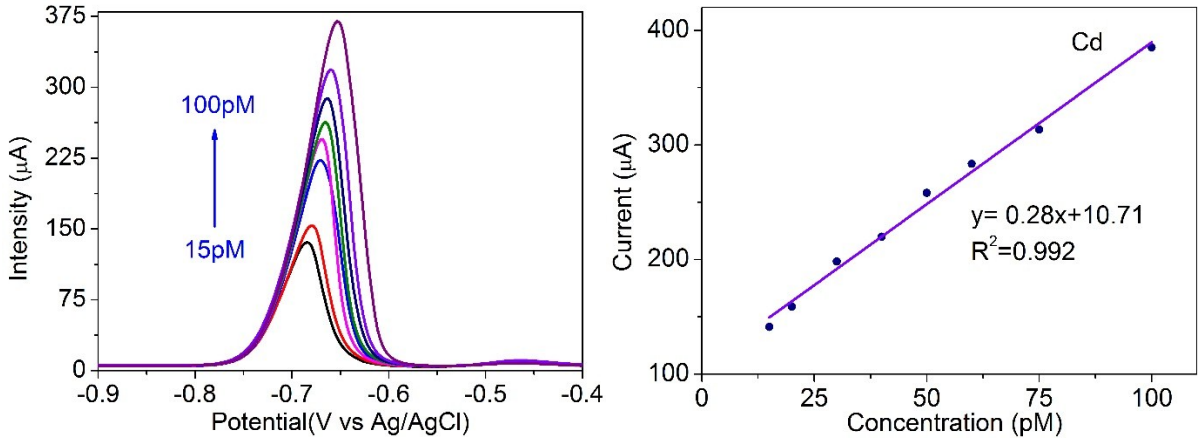

Fig. S9 Square wave anodic stripping voltammetry (left) and corresponding calibration plot (right) for individual analysis Cd^{2+} obtained at 0.5 M Bi/PC/Ch modified GCE from 15 to 100 pM Cd^{2+}.

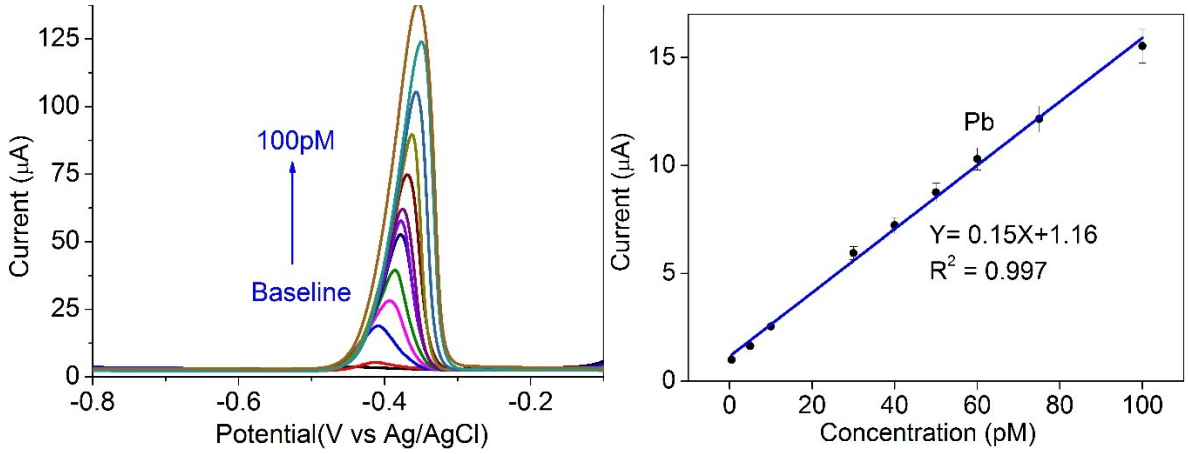

Fig. S10 Square wave anodic stripping voltammetry (left) and corresponding calibration plot (right) for Individual analysis Pb^{2+} obtained at 0.5 M Bi/PC/Ch modified GCE from baseline.