Supporting information

Room-temperature fabrication of three-dimensional reduced-graphene oxide/polypyrrole/hydroxyapatite composite scaffold for bone tissue engineering

Fuxiang Song,[a,b†] Weibo Jie,[c†] Ting Zhang,[a] Wen Li,[a] Yanjiao Jiang,[a] Liu Wan,[b] Wenjuan Liu,[a] Xiaocheng Li,[b*] Bin Liu[a*]

[a] *School of Stomatology of Lanzhou university, Lanzhou, 730000, China. Email: liubkq@lzu.edu.cn*

[b] *Laboratory of Clean Energy chemistry and Materials, Lanzhou Institute of Chemical Physics Chinese Academy of Sciences. Lanzhou, China, 730000. Email: xiaocheng@licp.cas.cn*

[c] *School of civil engineering of Lanzhou university. Lanzhou, China, 730000.*

† *These authors contributed equally to this work.*

Fig. S1 shows the XRD patterns of 3D NF/rGO/PPY before and after etching away the nickel foam. It can be seen in the XRD data of 3D NF/rGO/PPY that the three characteristic peaks centered at 44.6°, 52.3°, and 76.8° correspond to the (111), (200), and (220) diffraction planes of the metallic nickel (JCPDS No. 78-0643)[1, 2]. After the NF etching away, only a broad peak within the range of 15° to 30°, which can attributed to the prepared rGO/PPY composite, can be observed[3]. This result confirmed that the NF was successfully removed from the 3D NF/rGO/PPY scaffold.

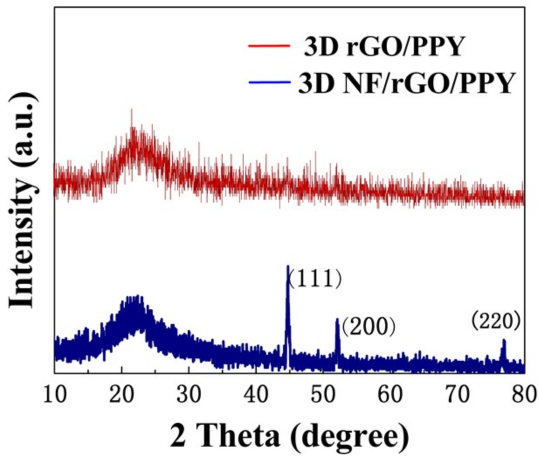

Fig. S1 XRD patterns of the prepared 3D NF/rGO/PPY (blue line) and 3D rGO/PPY scaffold (red line).

Fig. S2 shows the XPS spectra of 3D rGO/PPY/HA. The Ca/P molar ratio is listed in Table 1. Before HA was coated, the survey XPS spectrum only showed the peaks of C 1s, N 1s, and O 1s, while the new peaks of Ca 2p, P 2p, etc. were clearly observe on 3D rGO/PPY/HA composite scaffold (Fig. S2a). The Ca 2p XPS spectra reveal that the Ca 2p spectrum is a doublet with Ca 2p3/2 and Ca 2p1/2 at 347.2 eV and 350.8 eV, respectively (Fig. S2b), and the P 2p peak is symmetric with binding energy of 133.2 eV (Fig. S2c)[4]. These indicate that the precipitant on the surface of 3D rGO/PPY scaffold is apatite[5]. Moreover, the Ca/P molar ratio in electrodeposited HA coating is calculated to be 1.62, which is much closed to stoichiometric ratio of 1.67 in pure hydroxyapatite. This revealed that the HA successfully coated on the backbone of 3D rGO/PPY scaffold.

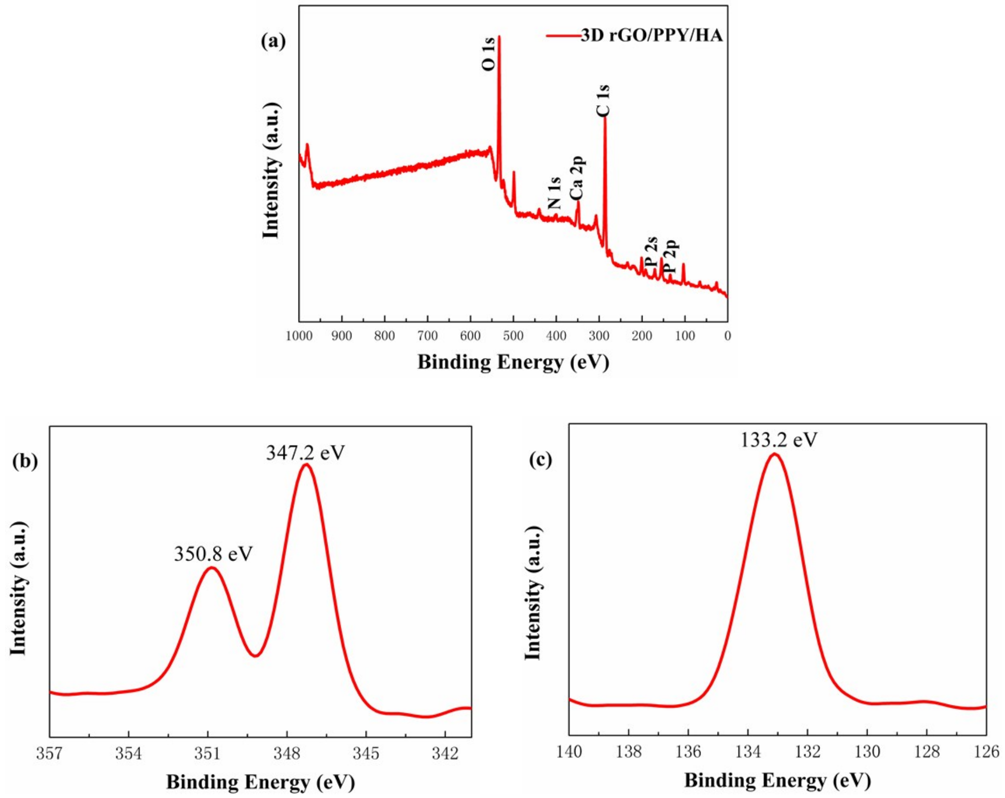

Fig. S2 XPS spectra of 3D rGO/PPY/HA: (a) XPS survey spectra, (b) Ca 2p, and (c) P 2p core-levels.

Table S1 Molar ratios of coated HA samples.

	Ca (atomic %)	P (atomic %)	Ca/P ratio
3D rGO/PPY/HA	4.07	2.52	1.62

[1] N. B. Trung, T. V. Tam, D. K. Dang, K. F. Babu, E. J. Kim, J. Kim, et al., *Chem Eng J (Lausanne)*, 2015, **264**, 603-9.

[2] J. W. Lee, T. Ahn, D. Soundararajan, J. M. Ko, J. D. Kim, *Chem Commun (Camb)*, 2011, **47**, 6305-7.

[3]S.J. RETTIG, J. TROTTER,Acta Crystallogr., Sect. C: Cryst. Struct. Commun., 1987, **43**, 2260-2262.

[4] H. Hu, Z.-D. Cui, S.-L. Zhu, Z.-Y. Li, Y.-Q. Liang, X.-J. Yang, *Rare Metals*, 2014, **34**, 22-7.

[5]H.B. Lu, C.T. Campbell, D.J. Graham, B.D. Ratner, *Anal Chem*, 2000, **72**:2886-2894.