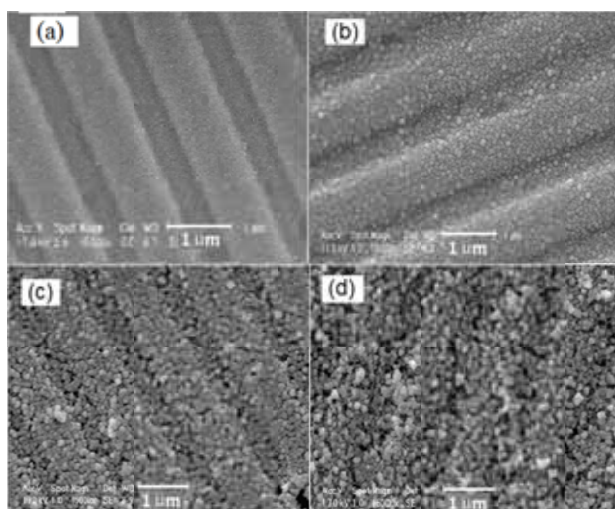
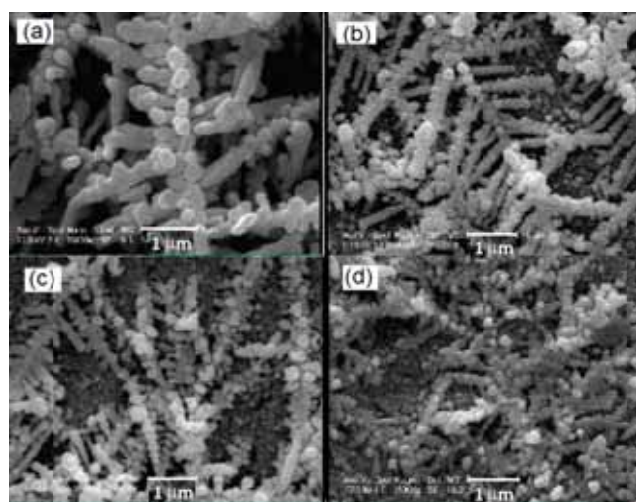


## Electrocatalytic oxidation of ethanol at Pd/Ag nanodendrite prepared via low support electrodeposition and galvanic replacement

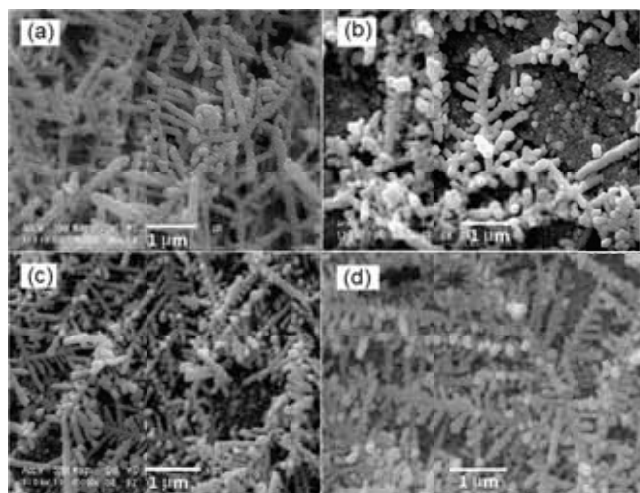
Nahid Abbasi, Paria Shahbazi and Abolfazl Kiani



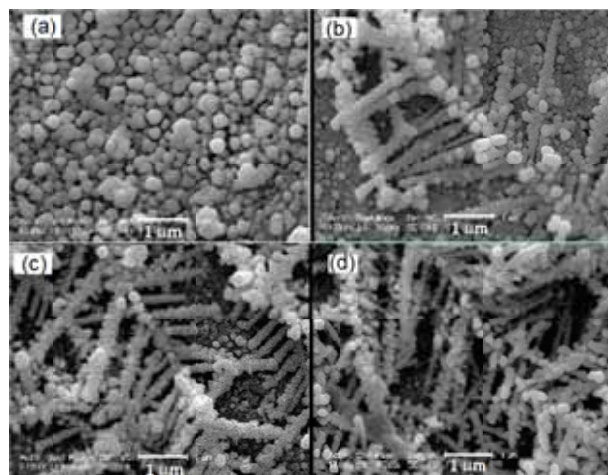
**Fig. E1** SEM images for the GNPf samples prepared in a solution of phosphate buffer (pH 7.4) for 3 min, applying a step potential from the open circuit potential (OCP) to 4.0V for various concentration of phosphate buffer. (a) 0, (b) 0.1, (c) 0.2, and (d) 0.5 M.



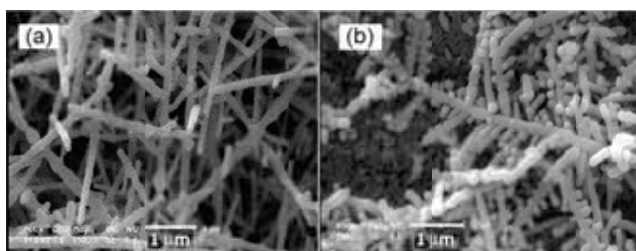
**Fig. E4** SEM images of as-deposited Ag dendrites electrode- posited at different applied current densities. (a) 0.046, (b) 0.093, (c) 0.14, and (d) 0.19 mA cm<sup>-2</sup>.



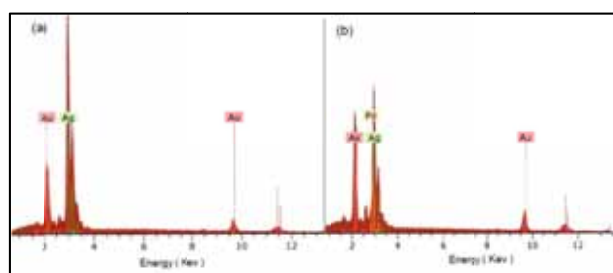
**Fig. E2** SEM images of the Ag nanostructures prepared in  $1.0 \times 10^{-3}$  M AgNO<sub>3</sub> for 3600s on (a) Au bare, (b) GNPf in 0.1M PB, (c) GNPf in 0.2M PB, (d)GNPF in 0.5 PB. The current density was applied at 0.14 mA cm<sup>-2</sup>.



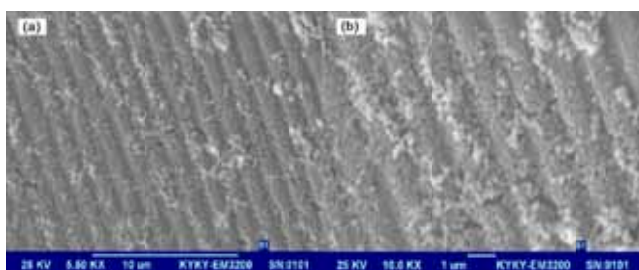
**Fig. E5** SEM images of the silver nanodendrites prepared for (A) 900 s, (B) 1800 s (C) 3600 s and (d) 5400 s. The current density was applied at 0.093 mA cm<sup>-2</sup>.



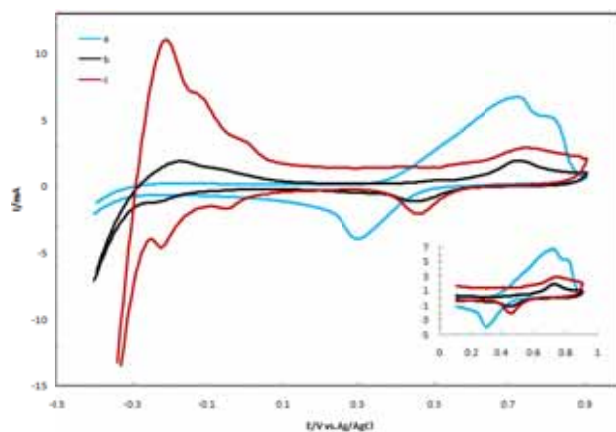
**Fig. E3** SEM image the Ag structures in the current density of  $0.14 \text{ mA cm}^{-2}$  for 3600s in various concentration of  $\text{AgNO}_3$ . (a)  $1.0 \times 10^{-4}$ , and (b)  $1.0 \times 10^{-3}$  M.



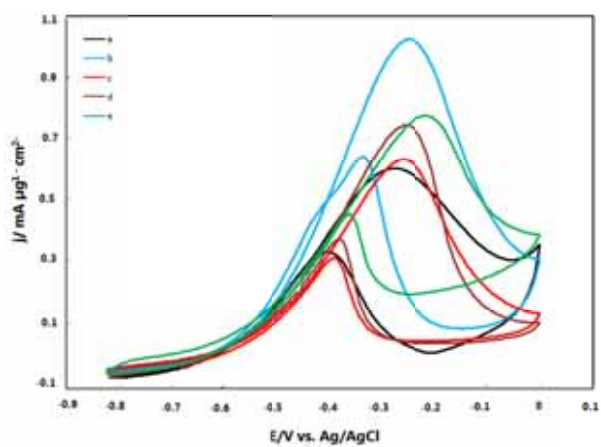
**Fig. E6** Energy dispersive X-ray pattern for (a) Ag dendrites, and (b) Pd/Ag dendrites.



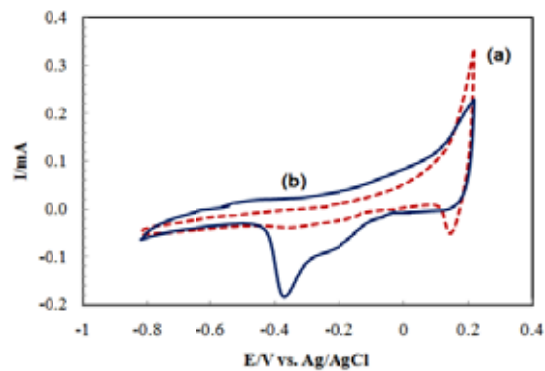
**Fig. E7** SEM images with different enlargement scales for the Pd/Ag nanoparticles.



**Fig.E9** Cyclic voltammetric responses of (a) Pd/Ag nanodendritic, (b) Pd/Ag nanoparticle, and (c) Pd nanodendritic coated GNPEs in  $1.0 \text{ M H}_2\text{SO}_4$ . The scan rate of potential was  $50 \text{ mVs}^{-1}$ .



**Fig. E8** CVs in  $1.0 \text{ M KOH} + 1.0 \text{ M ethanol}$  of Pd/Ag dendritic alloys at different time of replacement. (a) 30s, (b) 1min, (c) 3min, (d) 5min, and (e) 10 min. Scan rate of potential was  $50 \text{ mV s}^{-1}$ .



**Fig. E10** Cyclic voltammetric responses of (a) Ag nanodendritic and (b) Pd/Ag nanodendritic coated NPGF in the  $1.0 \text{ M KOH}$  solution. Scan rate was  $50 \text{ mV s}^{-1}$ .