Room-temperature synthesis of PtPd nanochains with self-assembled three-dimensional porous networks for oxygen reduction reaction

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Proton exchange membrane fuel cells (PEMFCs) have attracted much attention as an ideal solution for non-pollution and advanced electric vehicles. An efficient oxygen reduction reaction (ORR) offers the potential for clean energy generation in PEMFC. Shape-controlled Pt-based nanoalloys with high performance and stability in acidic media, especially, the PtPd alloys are still the preferred ORR catalysts. A facile room-temperature method has been developed to synthesize the three-dimensional ultralow Pt content PtPd nanochain structures by using the simple inorganic Na₂PdCl₄ and H₂PtCl₆ solution as precursor in the absence of surfactants and templates. The size, morphology and surface composition of the PtPd nanochain networks are characterized by XRD, EDS and TEM. The results show that the PtPd nanochains have low platinum content which is well self-assembled into a unique three-dimensional porous network. The 3D PtPd nanochain networks are used as catalyst for ORR. It exhibits much higher mass activity and better stability than that of commercial Pt/C catalyst.

Fig1. The TEM images of PtPd nanochain networks.