Supporting Information for

Core-Shell Catalysts Consisting of Nanoporous Cores for Oxygen Reduction Reaction

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Figure S1. HAADF-STEM images of dealloyed Pd-Ni/C (d-PdNi/C) with a nanoporous structure.
Figure S2. A single d-PdNi particle in sample 3: HAADF-STEM image (A) and 2D EELS mapping (B).
Figure S3. Fourier transformed EXAFS of the data (red) and first-shell fit (dotted blue) of (a) Ni K and (b) Pd K edges from the as-synthesized sample.
The number of repeated cell units $N > N'$

Figure S4. Illustrations of porous and solid particles. The intensity (reverse of broadness) of a XRD peak depends on the number of repeated cell units ($N$) in one direction ($a$) in the crystal (p.6 in prism.mit.edu/xray/CrystalSizeAnalysis.ppt):

$$I = I_e F^2 \frac{\sin^2(\pi/\lambda)(s-s_o) \cdot N_i a_i \cdot \sin^2(\pi/\lambda)(s-s_o) \cdot N_2 a_2 \cdot \sin^2(\pi/\lambda)(s-s_o) \cdot N_3 a_3}{\sin^2(\pi/\lambda)(s-s_o) \cdot a_1 \cdot \sin^2(\pi/\lambda)(s-s_o) \cdot a_2 \cdot \sin^2(\pi/\lambda)(s-s_o) \cdot a_3}$$

The larger the number $N$, the higher the intensity (narrower of the XRD peak). For a porous particle, the number of the repeated unit cells ($N'$) is smaller than that a solid particle with a similar overall particle size, resulting in a smaller crystallite size using Scherrer equation.
Figure S5. TEM image of sample 3 after first stage of dealloying in 1 M HNO₃ at 60°C for 1 hr. Porous structure was seen in some of the particles.