Supporting Information

Ternary PtSnRh-SnO_2 Nanoclusters: Synthesis and Electroactivity for Ethanol Oxidation Fuel Cell Reaction

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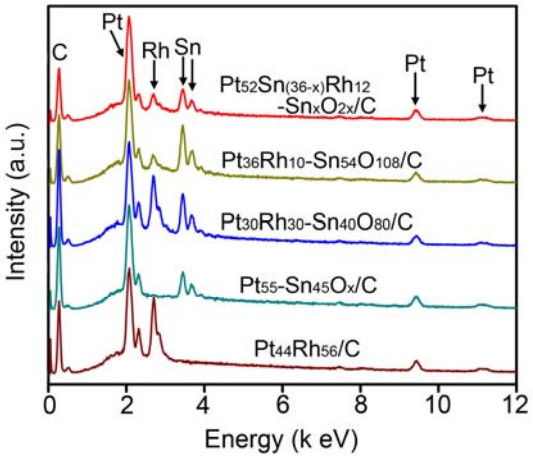

Figure S1. EDS spectra of as-made $Pt_{52}Sn_{(36-x)}Rh_{12}$–$Sn_xO_{2x}$ /C, $Pt_{36}Rh_{10}$–$Sn_{54}O_{108}$/C and $Pt_{30}Rh_{30}$–$Sn_{40}O_{80}$/C, Pt_{55}–$Sn_{45}O_x$/C, and $Pt_{44}Rh_{56}$/C carbon supported nanoparticles.

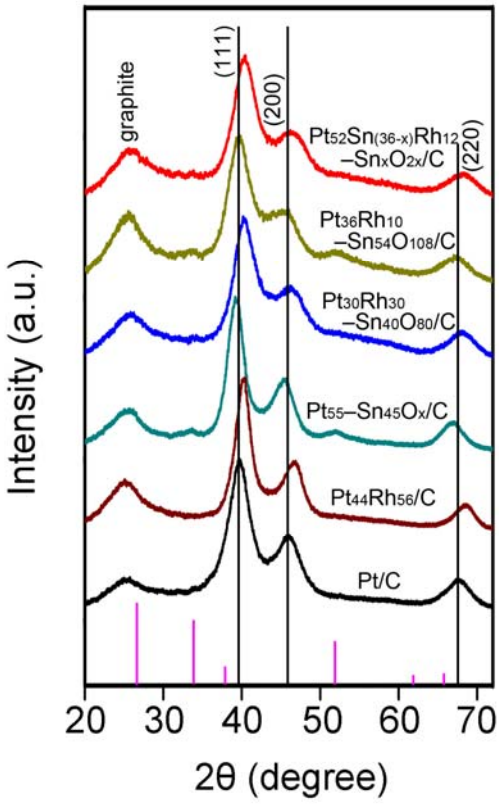

Figure S2. XRD patterns of as-made $Pt_{52}Sn_{(36-x)}Rh_{12}$–$Sn_xO_{2x}$ /C, $Pt_{36}Rh_{10}$–$Sn_{54}O_{108}$/C and $Pt_{30}Rh_{30}$–$Sn_{40}O_{80}$/C, Pt_{55}–$Sn_{45}O_x$/C, $Pt_{44}Rh_{56}$/C, and Pt/C (ETEK) carbon supported

nanoparticles. The bottom lines (pink) represent the XRD pattern of tetragonal SnO_2 from JCPDS database.

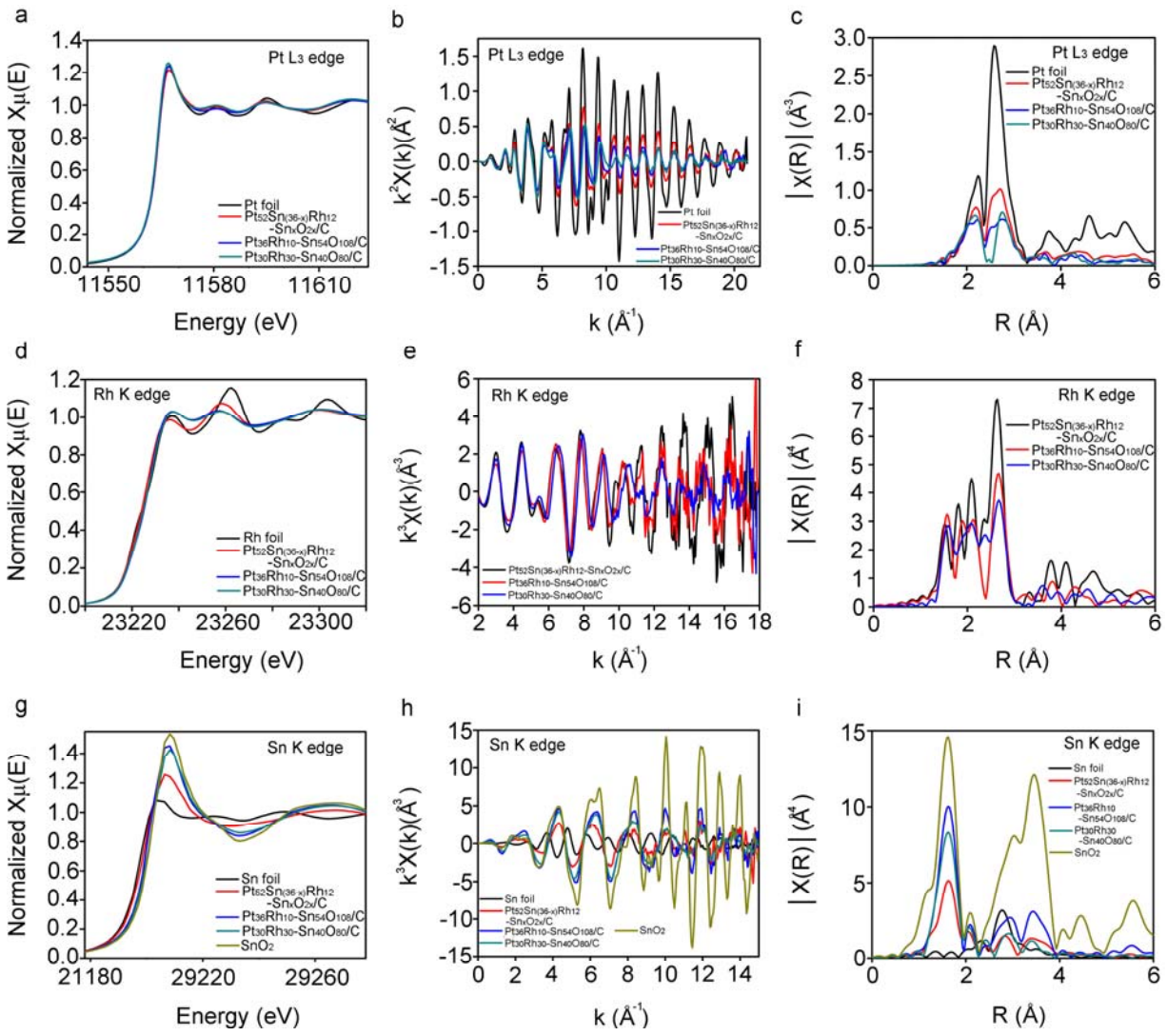

Figure S3. XANES and EXAFS spectra for three Pt/Sn/Rh catalysts: $Pt_{52}Sn_{(36-x)}Rh_{12}$–$Sn_xO_{2x}$ /C, $Pt_{36}Rh_{10}$–$Sn_{54}O_x$/C and $Pt_{30}Rh_{30}$–$Sn_{40}O_x$/C : (a, b, c) Pt L3 edge; (d, e, f) Rh K edge; (g, h, l) Sn K edge. For k-space and R-space data, k^2–weighting is used for Pt L3 data and k^3–weighting for Rh K edge and Sn K edge.

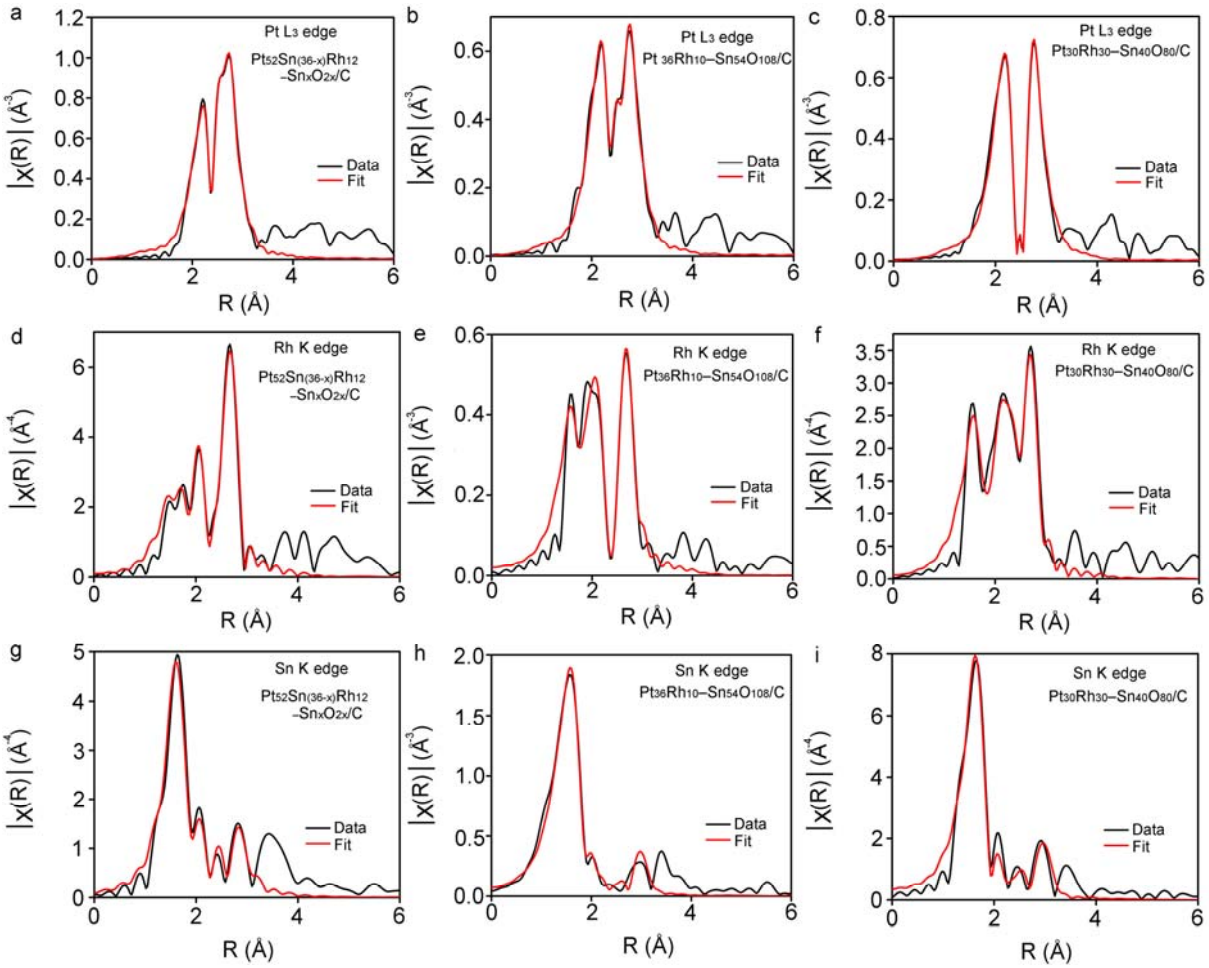

Figure S4. Fourier transform magnitudes of EXAFS data of the (a, b, c) Pt L_3 edge, (d, e, f) Rh K edge, (g, h, i) Sn K edge, for three carbon-supported Pt/Sn/Rh ternary catalysts**.**

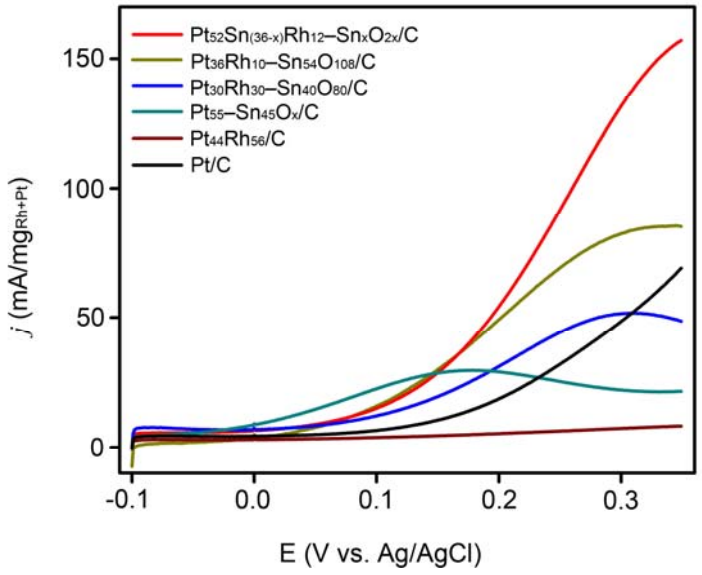

Figure S5. CV curves of $Pt_{52}Sn_{(36-x)}Rh_{12}–Sn_xO_{2x}$ /C, $Pt_{36}Rh_{10}–Sn_{54}O_{108}$/C, $Pt_{30}Rh_{30}–Sn_{40}O_{80}$/C, $Pt_{55}–Sn_{45}O_x$ /C, $Pt_{44}Rh_{56}$/C, and Pt/C (ETEK) in ethanol-containing acid solution.

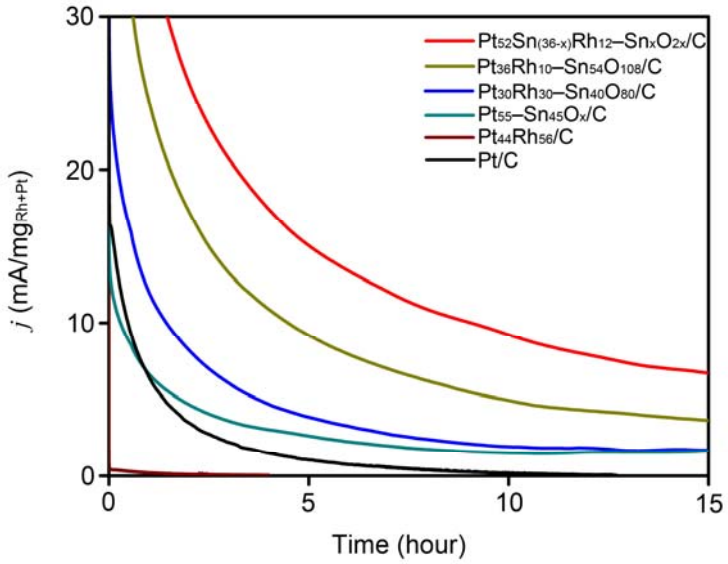

Figure S6. IT curves of $Pt_{52}Sn_{(36-x)}Rh_{12}–Sn_xO_{2x}$ /C, $Pt_{36}Rh_{10}–Sn_{54}O_{108}$/C, $Pt_{30}Rh_{30}–Sn_{40}O_{80}$/C, $Pt_{55}–Sn_{45}O_x$ /C, $Pt_{44}Rh_{56}$/C, and Pt/C (ETEK) in ethanol-containing acid solution.

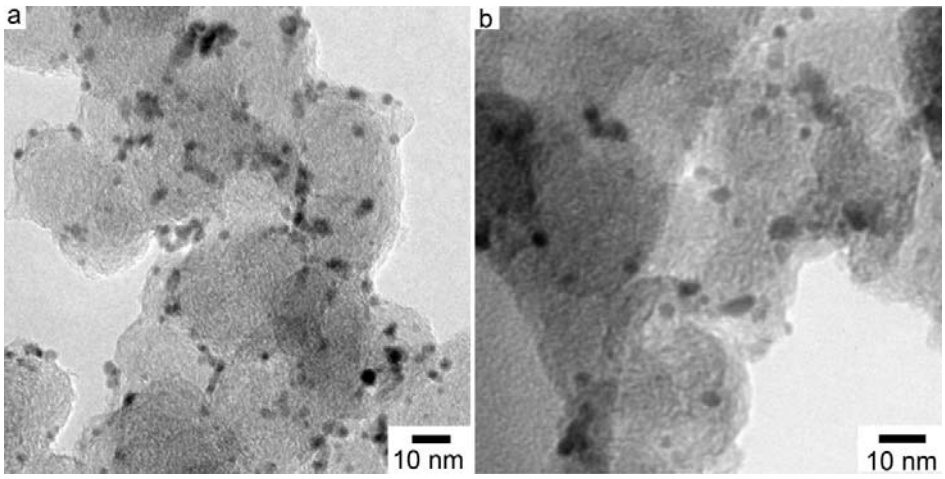

Figure S7. TEM images of carbon-supported (a) $Pt_{30}Rh_{30}$–$Sn_{40}O_{80}$ and (b) $Pt_{36}Rh_{10}$–$Sn_{54}O_{108}$ catalysts.