

Electronic Supplementary Information

Novel Synthetic route for the preparation of core shell like carbon-supported nanoparticles with a Pt-rich shell

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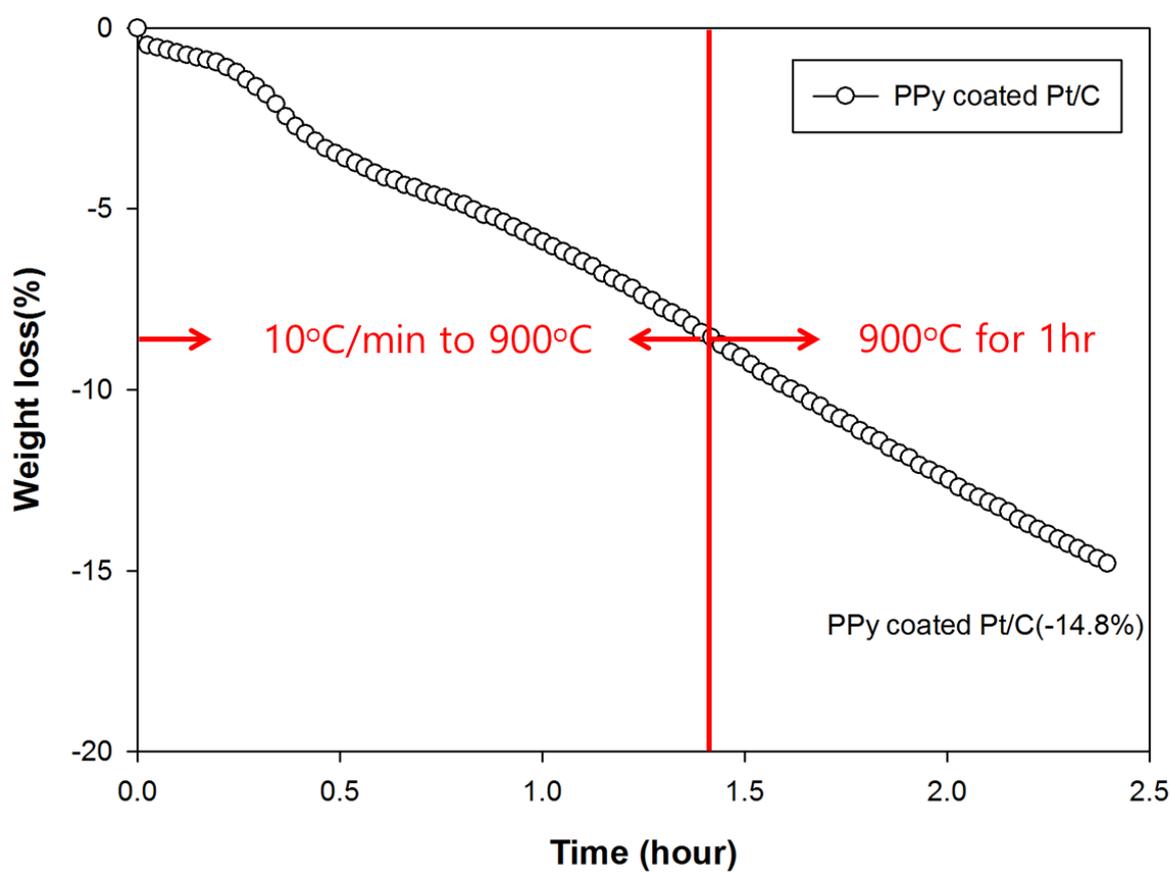


Figure S1. TGA result of Pt₂Ni₁/C(PPy-900). The temperature was increased at a rate of 10 °C min⁻¹ to 900 °C and it was maintained for 1 hr.

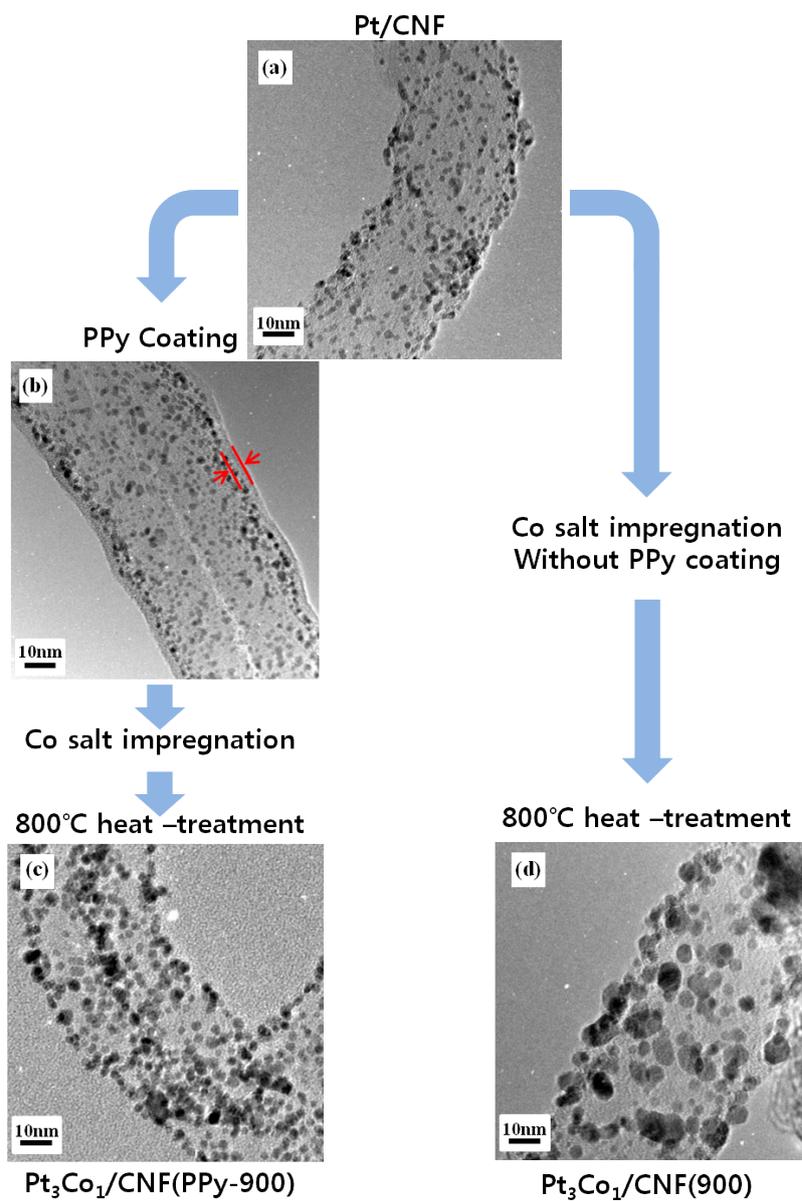


Figure S2. HR-TEM images of (a) Pt supported on the CNF supports by polyol process, (b) PPy-coated Pt/CNF, (c) Pt₃Co₁/CNF prepared by PPy coating process, and (d) Pt₃Co₁/CNF without PPy coating.

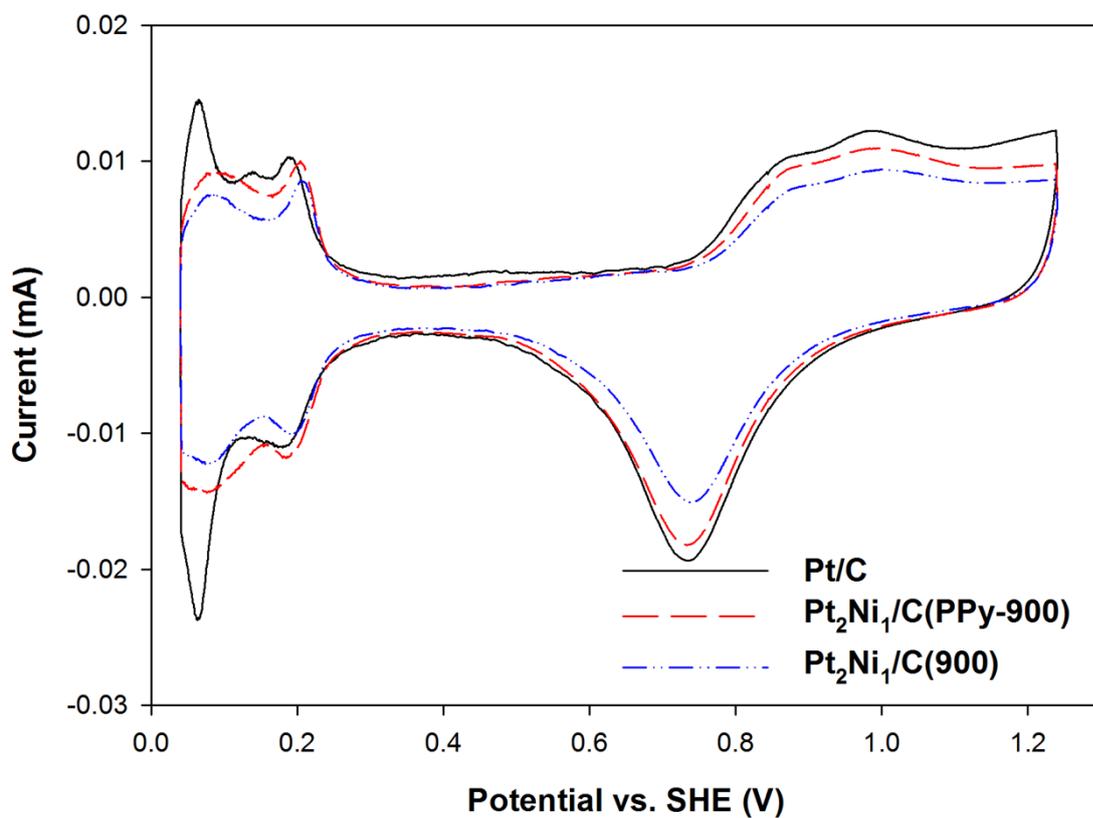


Figure S3. Cyclic voltammograms (CV) for as-prepared catalysts obtained in 0.5 M H₂SO₄ saturated with N₂ at a scan rate of 5 mV s⁻¹.

Table S1. Comparison of the ECSAs calculated based on cyclic voltammogram (H_{UPD}) and CO stripping voltammetry.

Catalyst	H _{UPD} (m ² g ⁻¹)	CO stripping (m ² g ⁻¹)
Pt/C	52.8	51.7
Pt ₂ Ni ₁ /C(PPy-900)	37.3	38.4
Pt ₂ Ni ₁ /C(900)	29.6	29.8

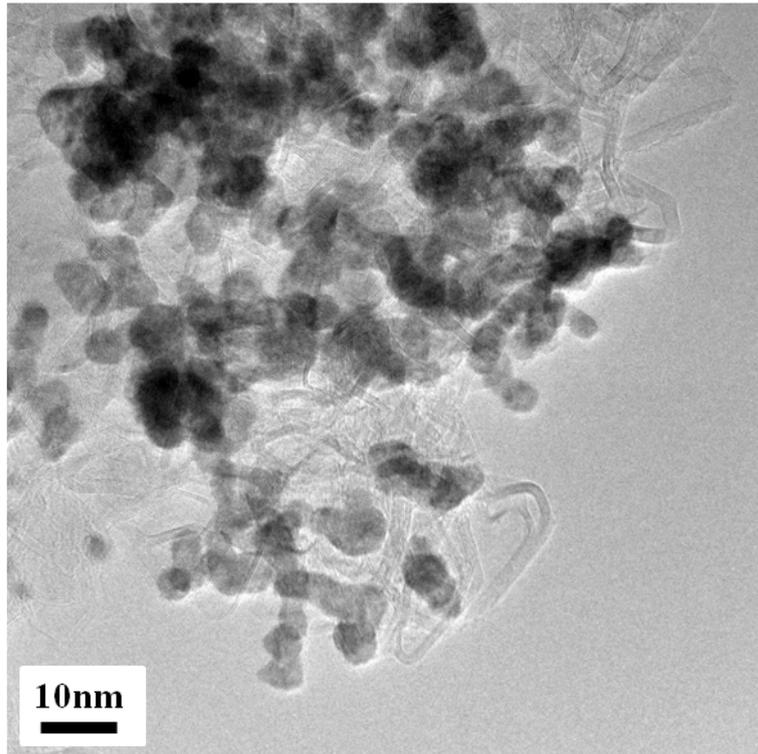


Figure S4. HR-TEM images of Pt₂Ni₁/C(NaBH₄-25).

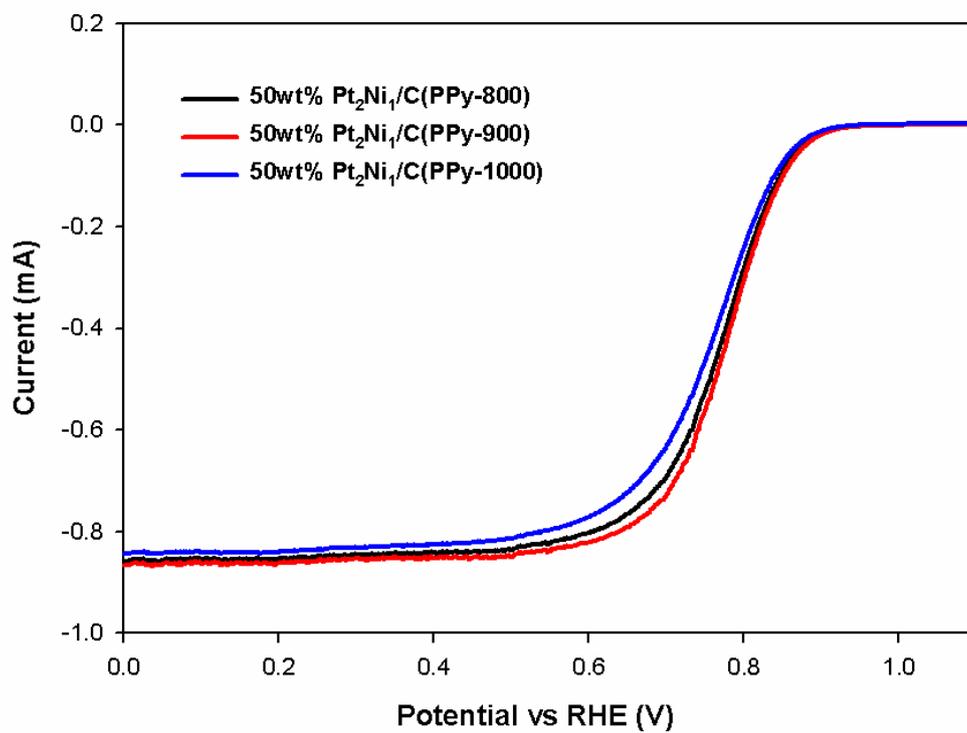


Figure S5. ORR polarization curves for 50 wt% Pt₂Ni₁(PPy-800), 50 wt% Pt₂Ni₁(PPy-900) and 50 wt% Pt₂Ni₁(PPy-1000) obtained in 0.1 M HClO₄ saturated with O₂ at a scan rate of 5 mV s⁻¹ and a rotation rate of 1200 rpm.

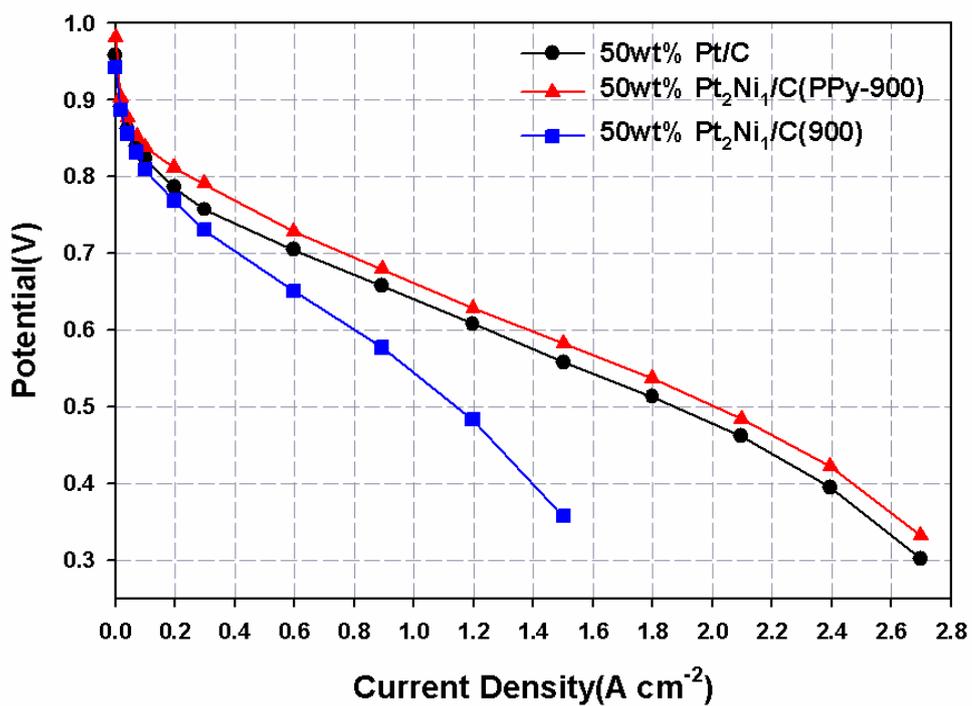


Figure S6. Polarization curves measured by MEA using as-prepared catalysts as the cathode with $0.1 \text{ mg}_{\text{metal}} \text{ cm}^{-1}$ loading. H_2 and O_2 gases with RH100% were fed to anode and cathode respectively. The cell temperature and operating pressure were 80°C and 1atm.

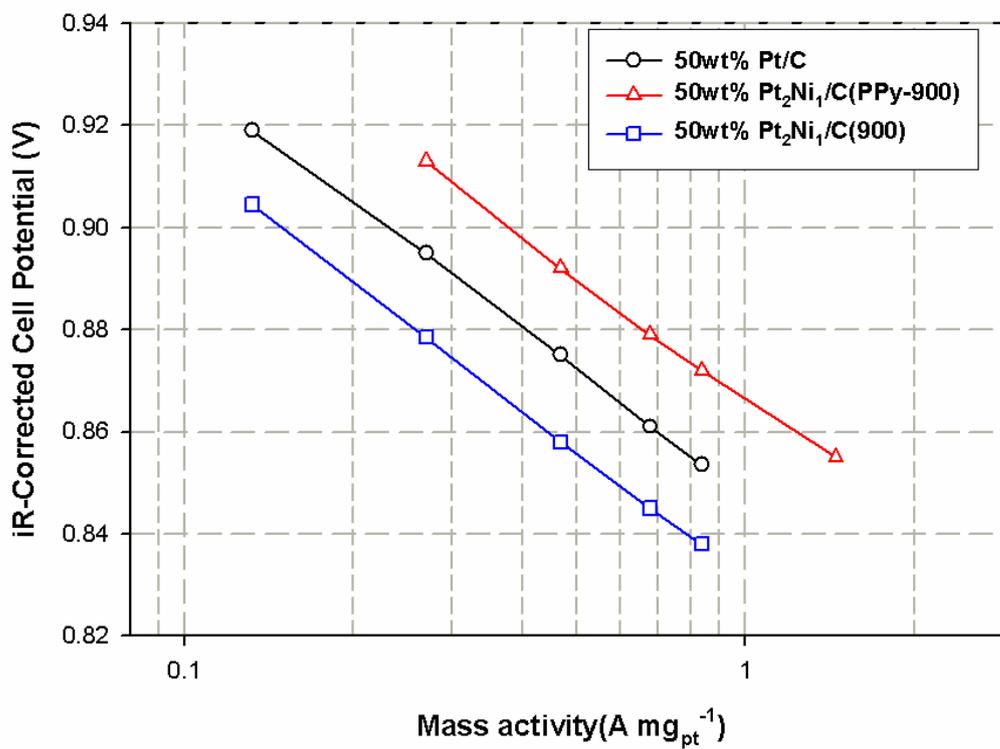


Figure S7. Tafel plots measuring mass activities of MEA normalized by Pt loading of cathode. The measuring conditions are H₂/O₂ at 80°C and 1.5atm