

Supporting Information

Stabilization of platinum-nickel alloy nanoparticles with sulfur-doped graphene support in polymer electrolyte membrane fuel cells

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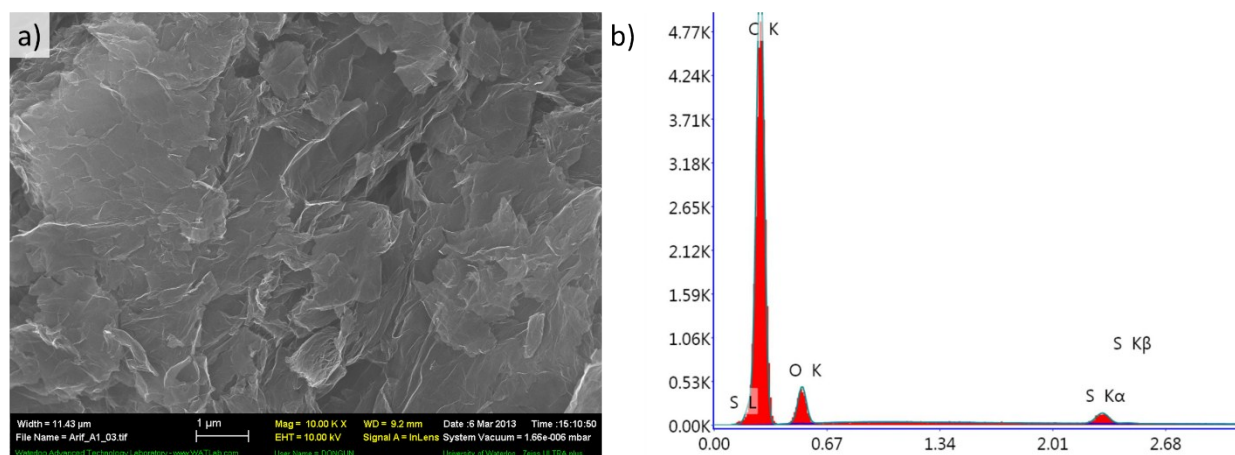


Figure S1. (a) SEM image of SG and (b) EDX of SG.

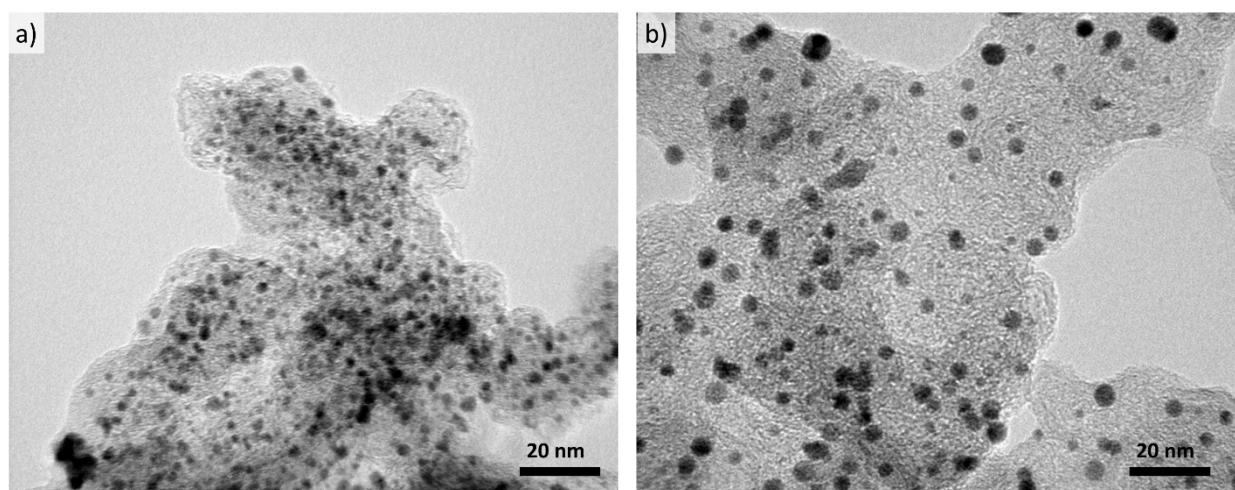


Figure S2. TEM images of Pt/C (a) before ADT and (b) after ADT.

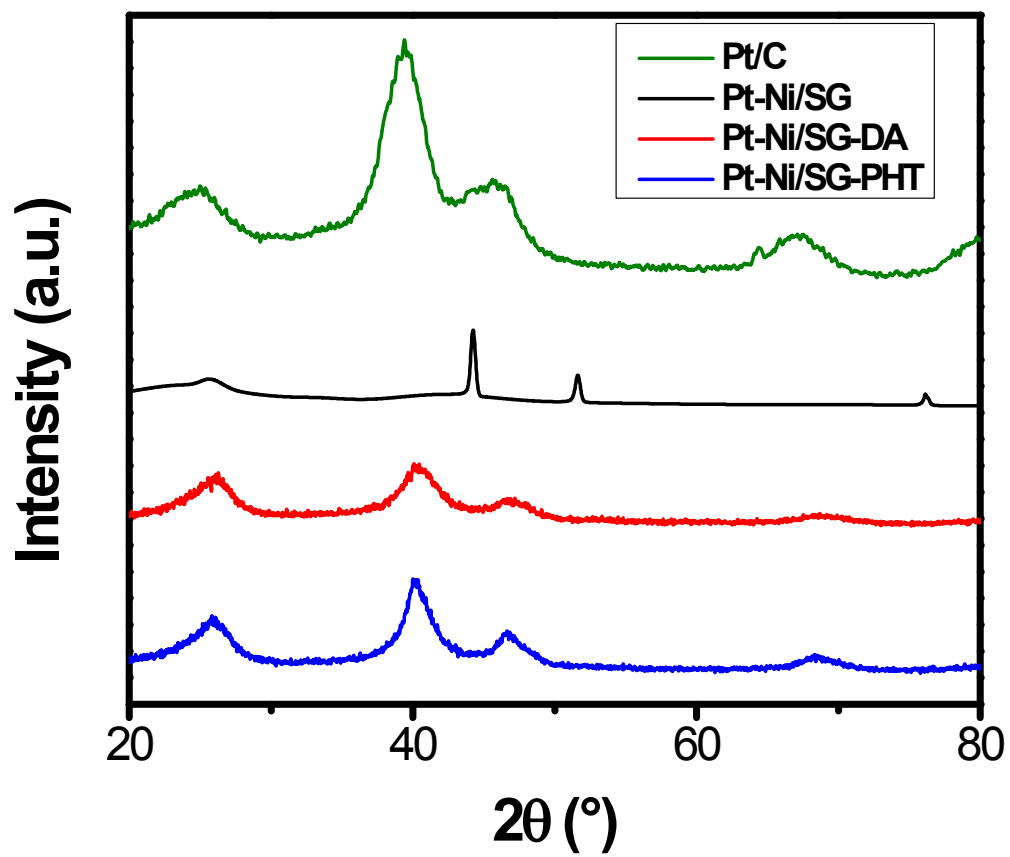


Figure S3. XRD patterns of Pt-Ni/SG, Pt-Ni/SG-DA, Pt-Ni/SG-PHT and commercial Pt/C.

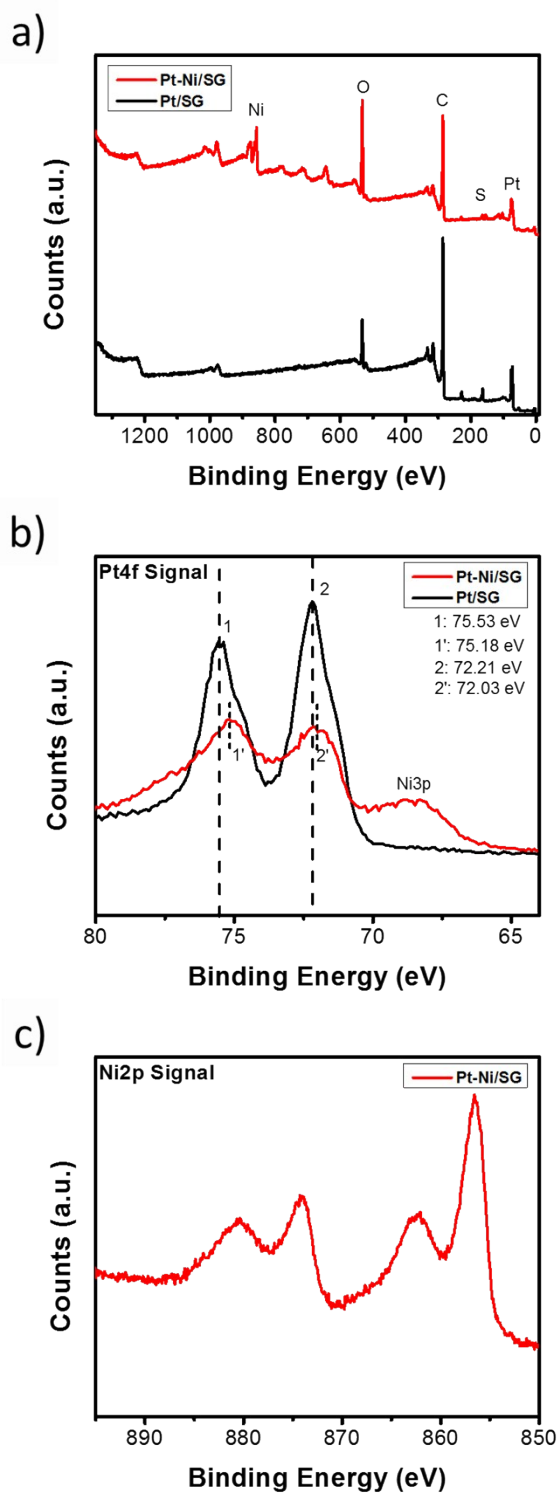


Figure S4. XPS spectra for (a) full range of Pt/SG and Pt-Ni/SG, (b) Pt4f spectra of Pt/SG and Pt-Ni/SG, and (c) Ni2p spectra of Pt-Ni/SG.

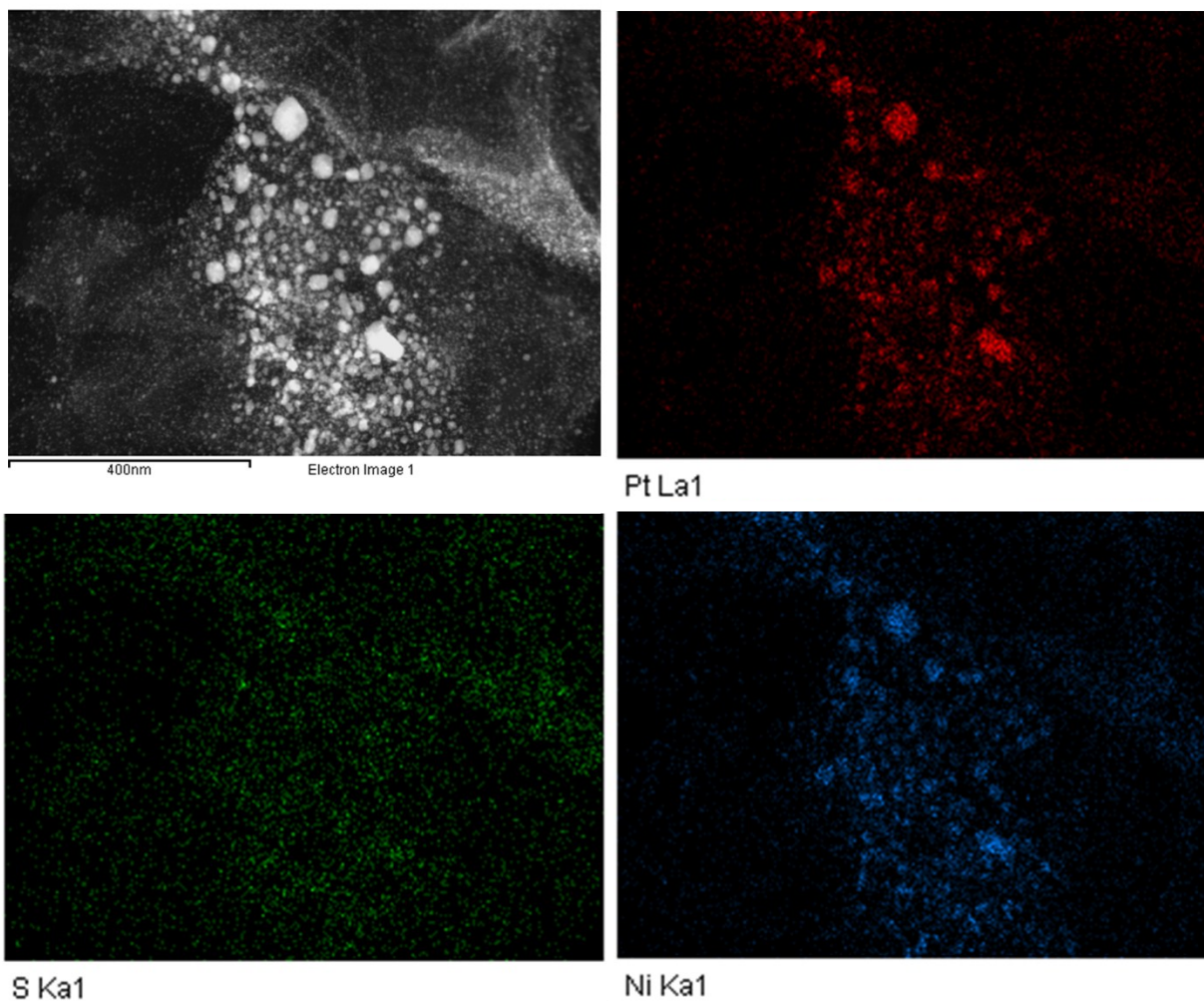


Figure S5. Elemental mapping of Pt-Ni/SG for S, Pt and Ni.

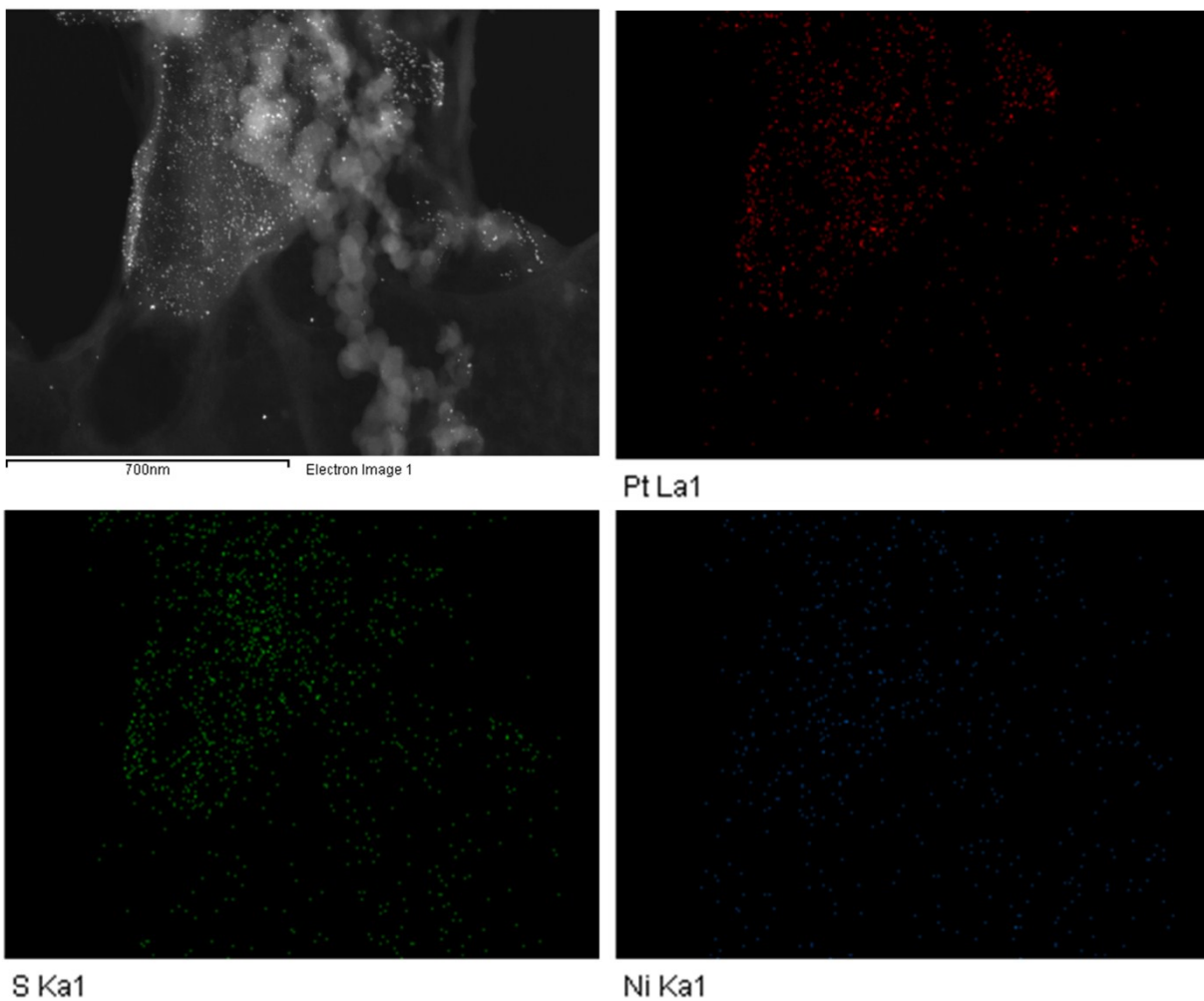


Figure S6. Elemental mapping of Pt-Ni/SG-ADT for S, Pt and Ni.

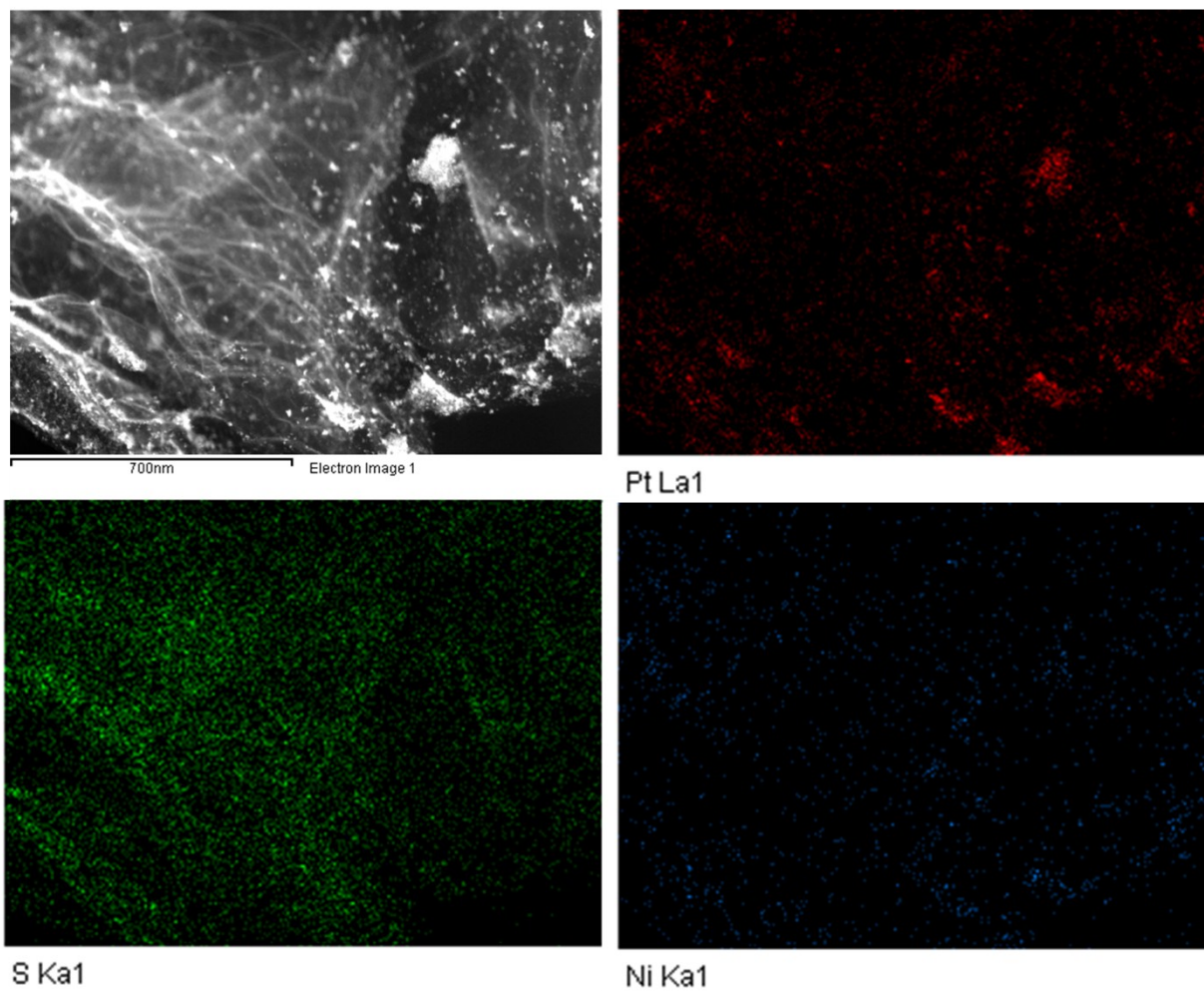


Figure S7. Elemental mapping of Pt-Ni/SG-DA for S, Pt and Ni.

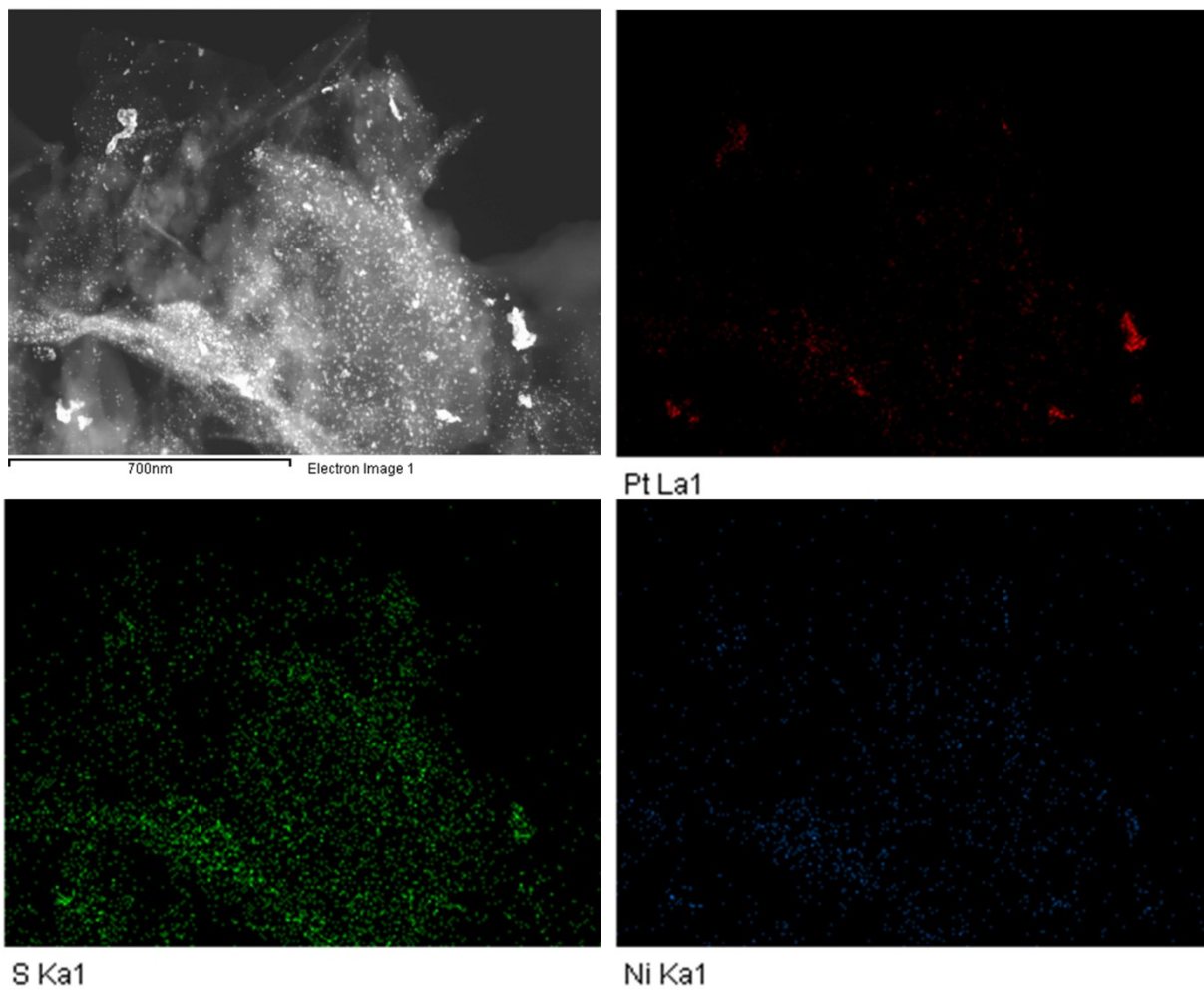


Figure S8. Elemental mapping of Pt-Ni/SG-DA-ADT for S, Pt and Ni.

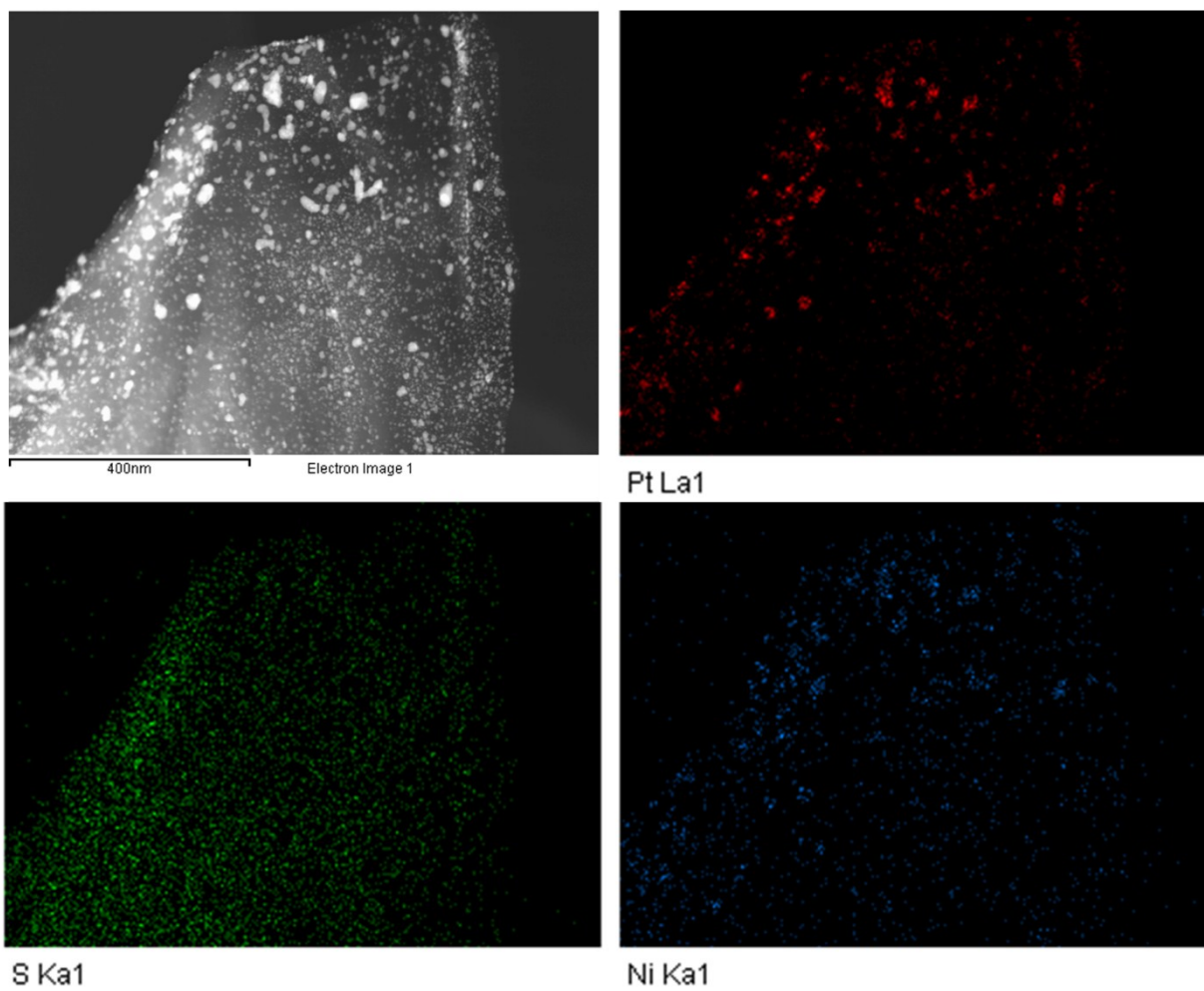


Figure S9. Elemental mapping of Pt-Ni/SG-PHT for S, Pt and Ni.

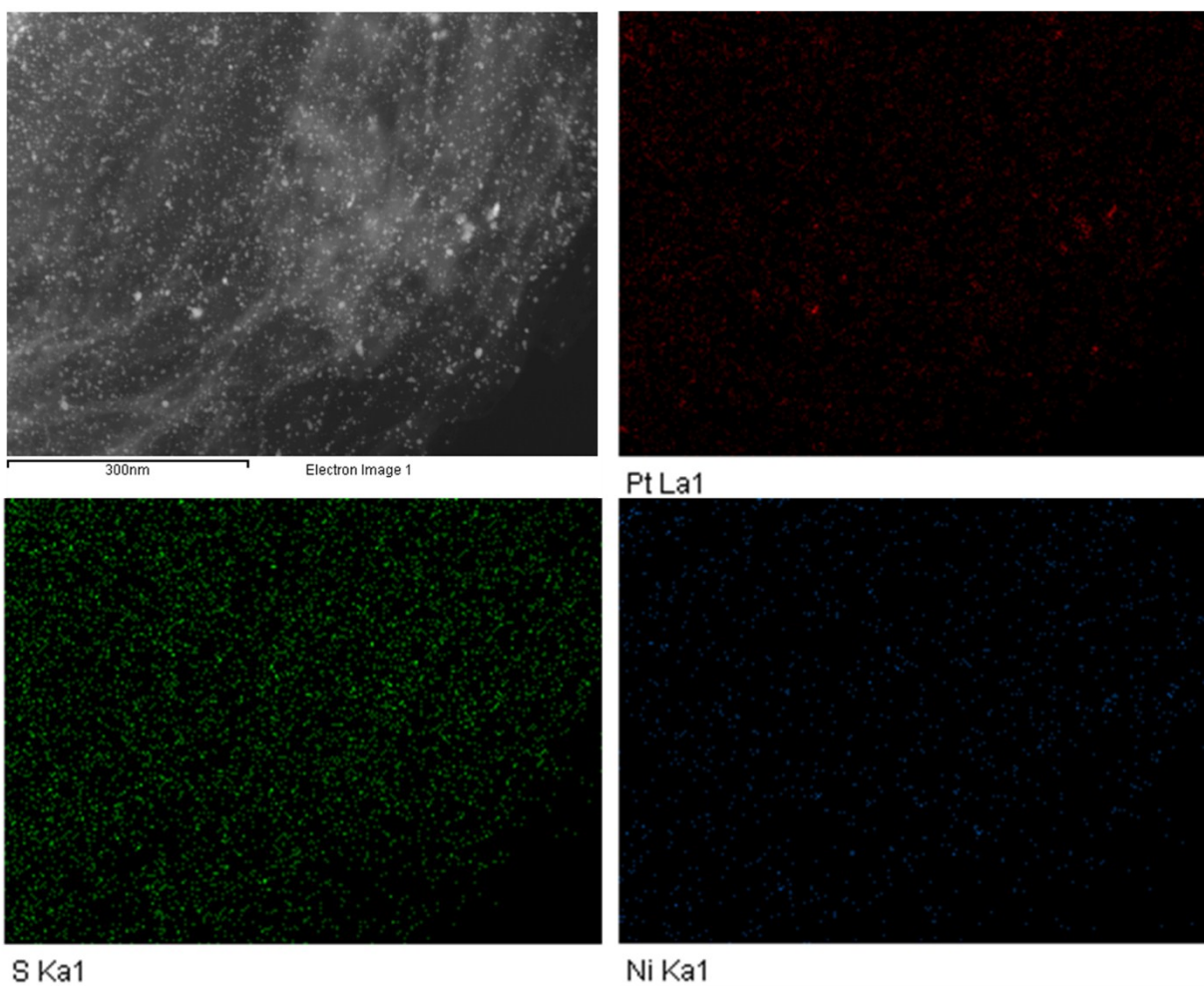


Figure S10. Elemental mapping of Pt-Ni/SG-PHT-ADT for S, Pt and Ni.

Table S1. Metal content of catalysts via ICP.

Catalyst	Nickel Mass %	Platinum Mass %
Pt-Ni/SG	16.78	10.73
Pt-Ni/SG-DA	0.24	10.00
Pt-Ni/SG-PHT	0.29	11.17