

Supporting Information

Trimetallic nanoalloy of NiFeCo embedded in phosphidated nitrogen doped carbon catalyst for efficient electro-oxidation of kraft lignin

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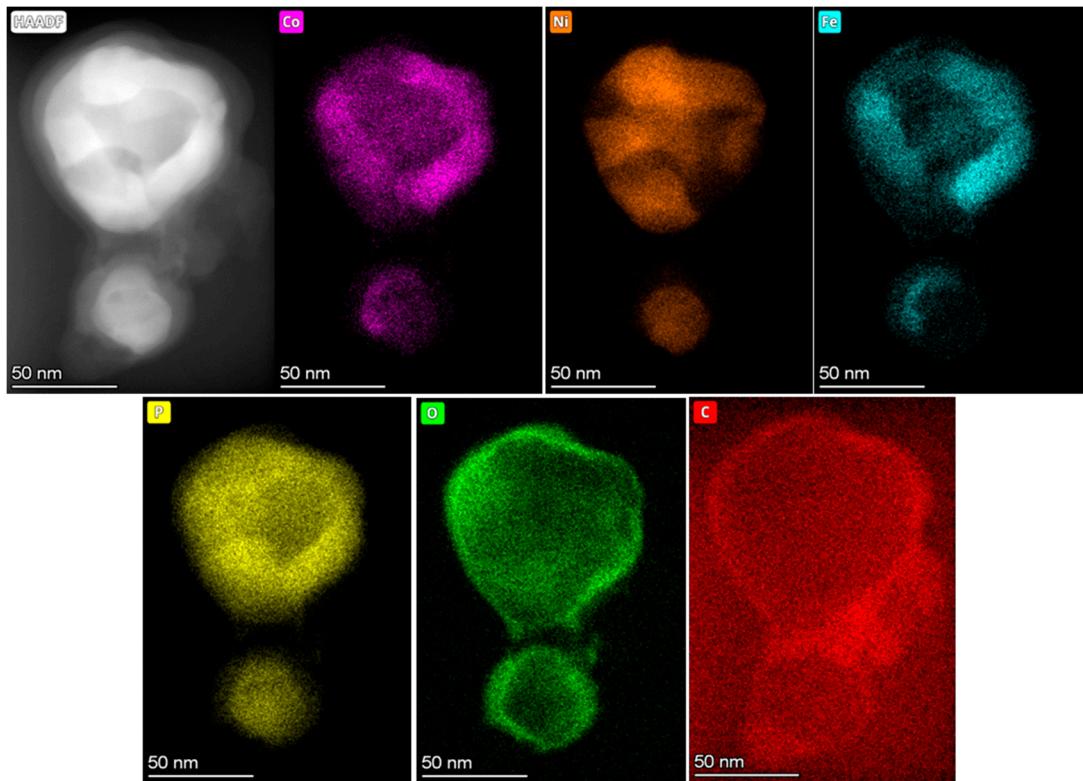


Figure. S1 HAADF-TEM image of NiFeCo nanoalloy and its corresponding elemental mappings Co, Ni, Fe, P, O, and C.

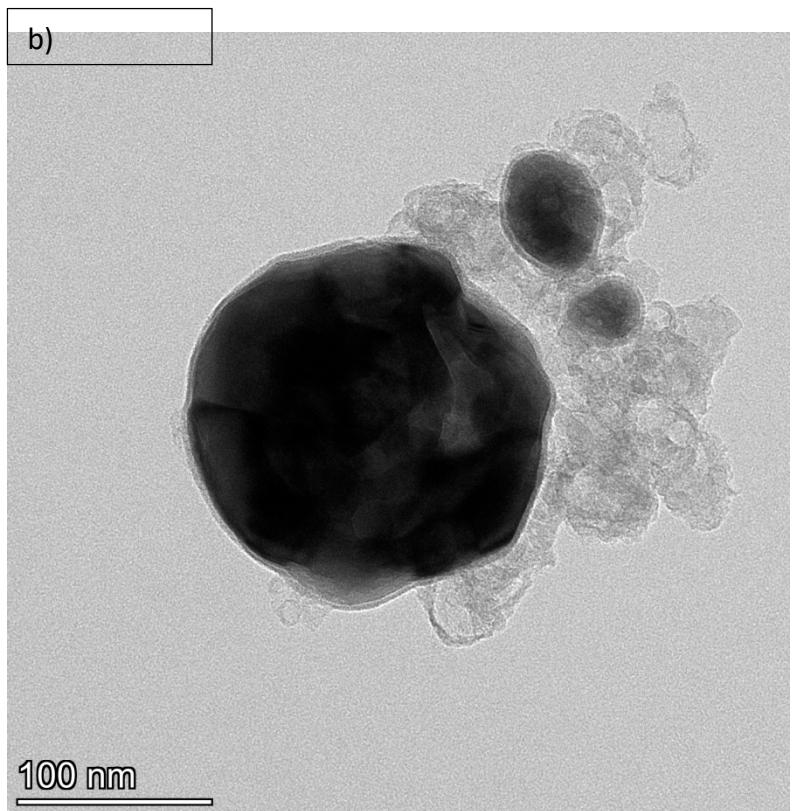
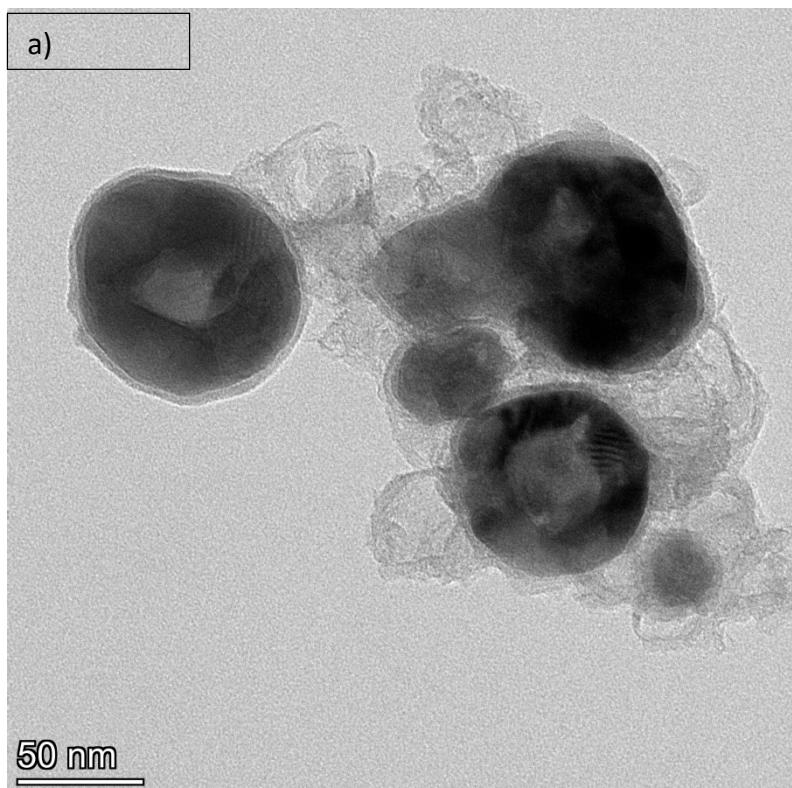


Figure. S2 a,b) TEM image of carbon shell protected trimetallic-nanoalloy.

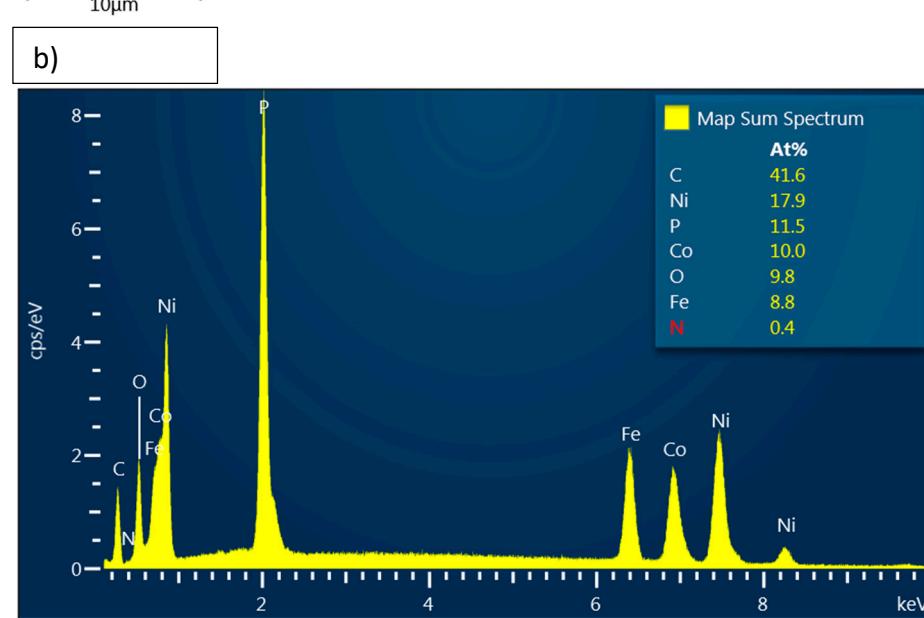
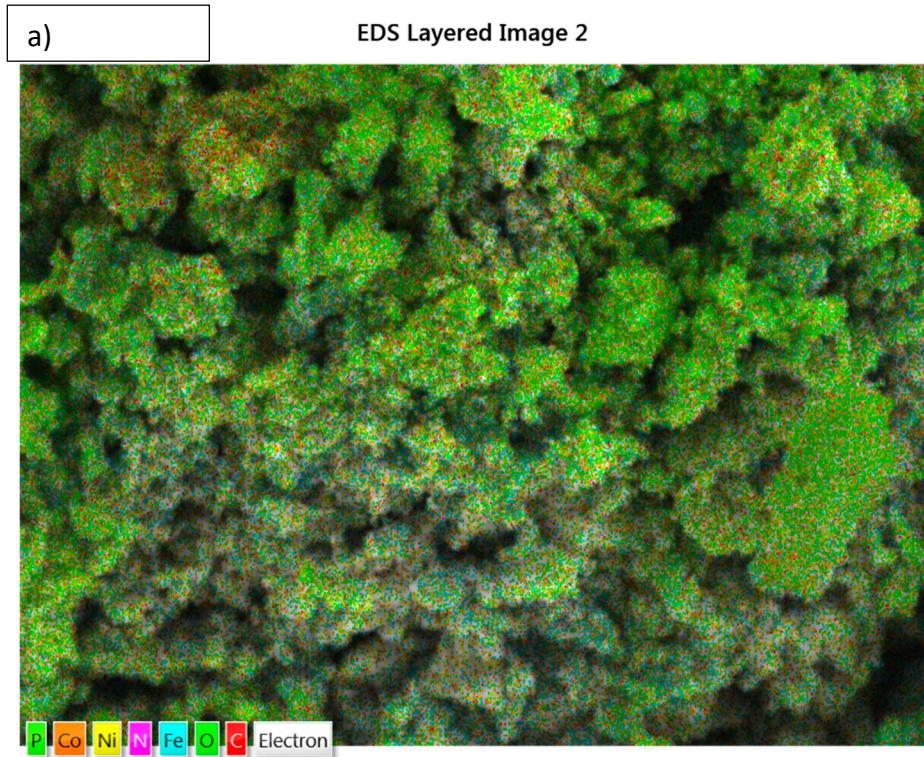


Figure. S3a) EDX mapping for the homogeneous distribution of the elements and **b)** scan line spectrum for the quantification of the elements C (41.6%), Ni (17.9%), P(11.5%), Co(10%), O (9.8%), Fe(8.8%) and N(0.4%).

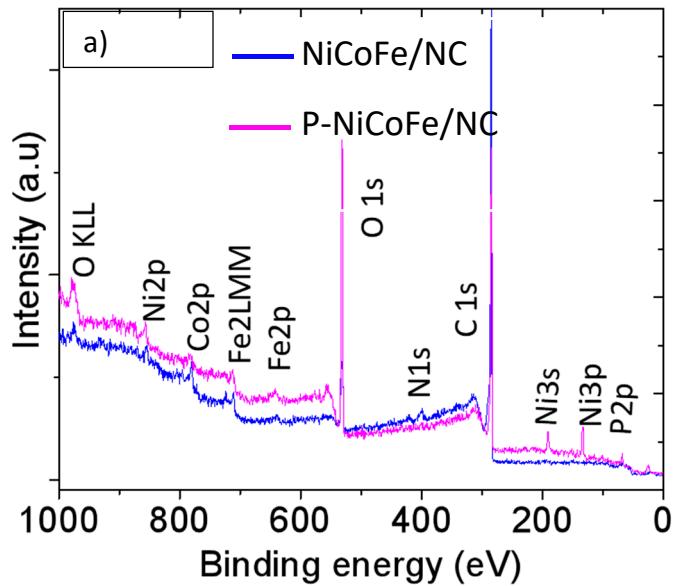


Figure. S4 XPS survey of the samples P-NiFeCo/NC (in pink) and NiFeCo/NC (in blue) showing the peaks of the elements at their specific binding energies.

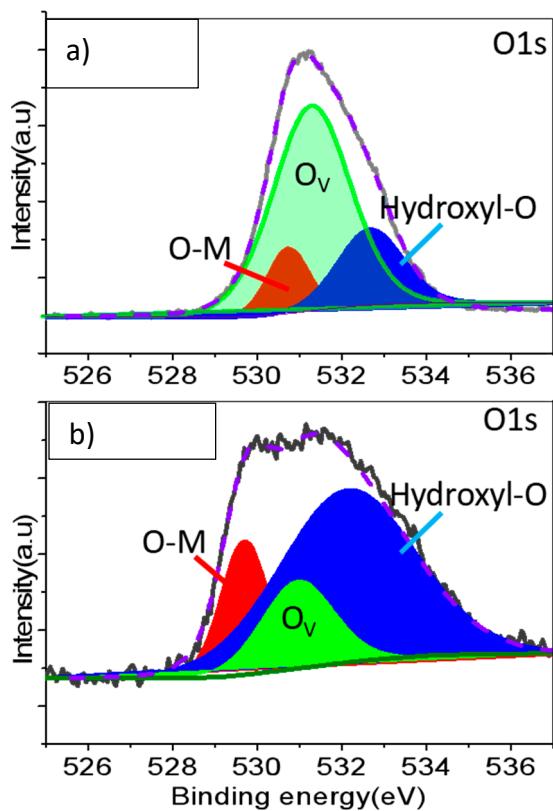


Figure. S5 O1s peaks deconvolution of the sample P-NiFeCo/NC a) and NiFeCo/NC b).

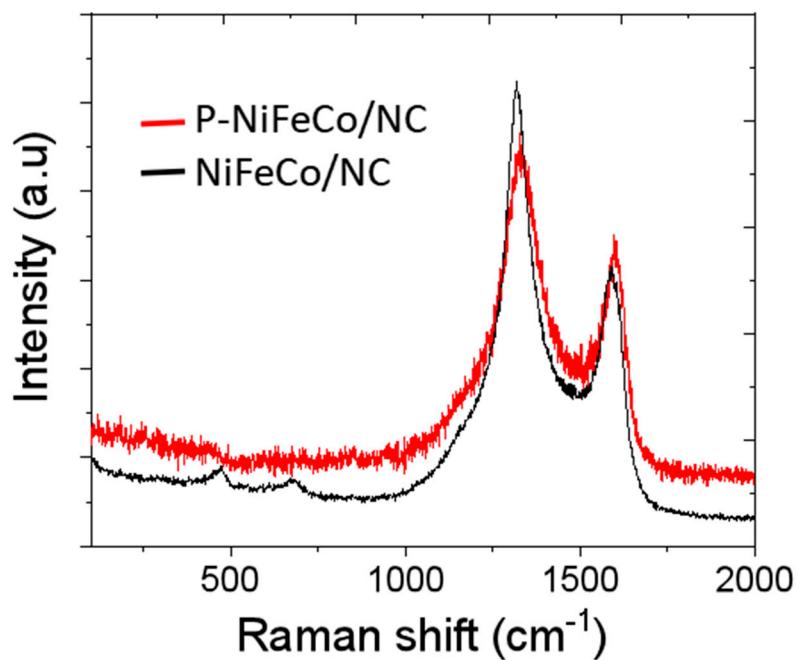


Figure. S6 Raman spectroscopy of the samples P-NiFeCo/NC (in red) and NiFeCo/NC (in black) showing the G and D bands.

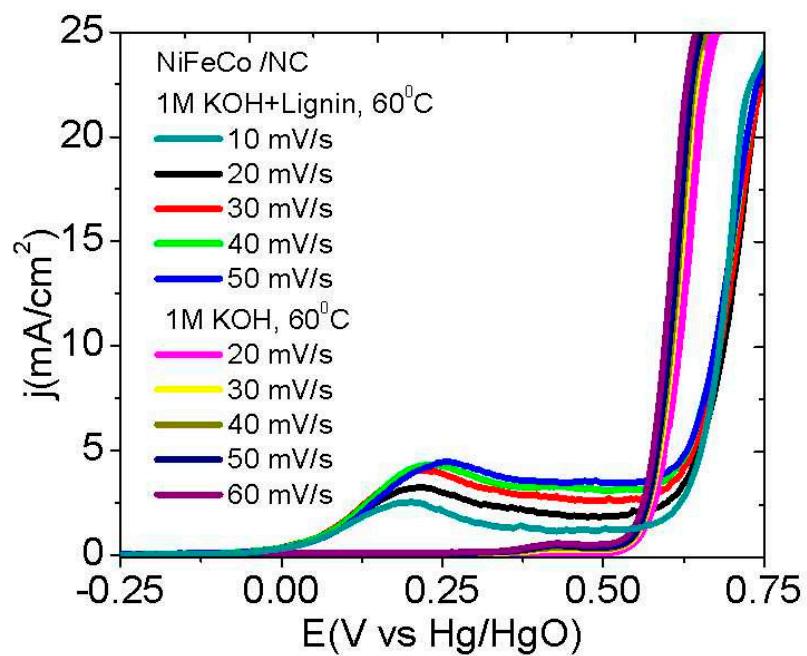


Figure. S7 LSV tests of NiFeCo/NC in 1 M KOH and b) in 1 M KOH + lignin at 60°C.

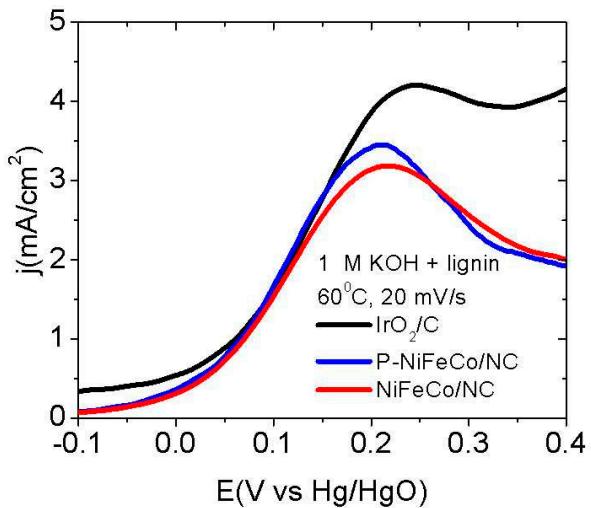


Figure.S8 LSV tests of IrO₂/C, P-NiFeCo/NC, and NiFeCo/N at 60°C, 20 mV/s in lignin electro-oxidation in 1 M KOH + lignin.

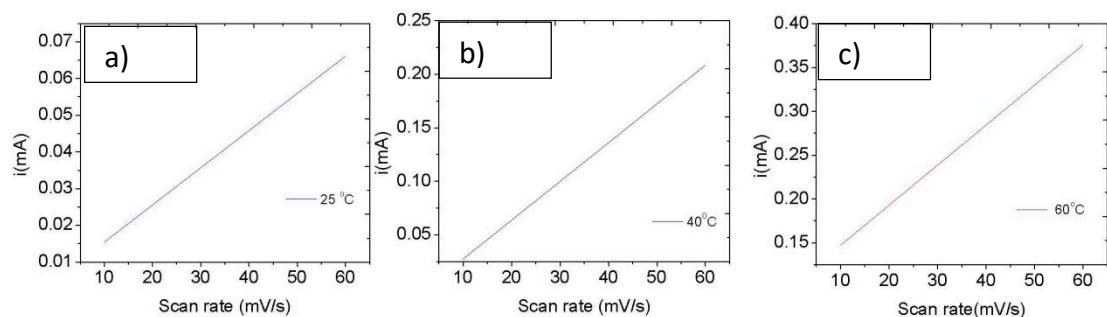


Figure.S9 a,b,c) Curves of current at lignin oxidation peaks (mA) versus scan rates from the LSVs taken at 25°C, 40°C and 60°C.