

# Identification of the nitrogen species on N-doped graphene layers and Pt/NG composite catalyst for direct methanol fuel cell

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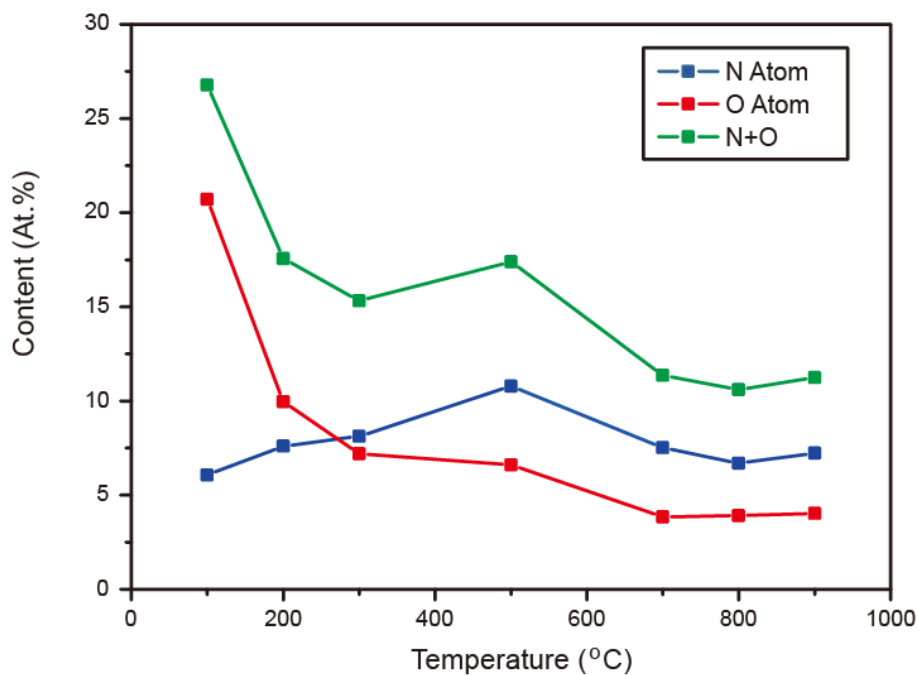


Figure S1 Change of the content of the doped nitrogen and oxygen in atom ration in NG samples.

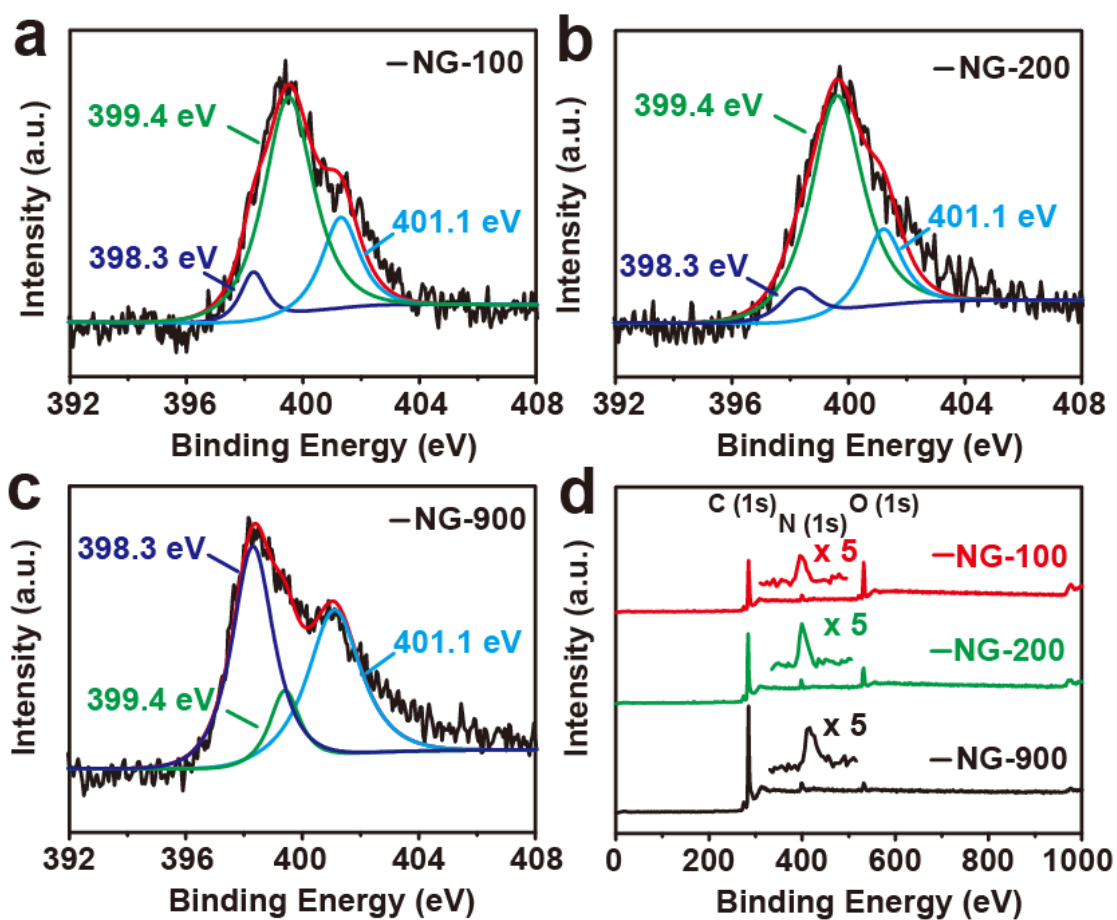


Figure S2 (a), (b) and (c) N 1s XPS of NG-100, NG-200 and NG-900; (d) Full range XPS of  
NG-100, NG-200 and NG-900

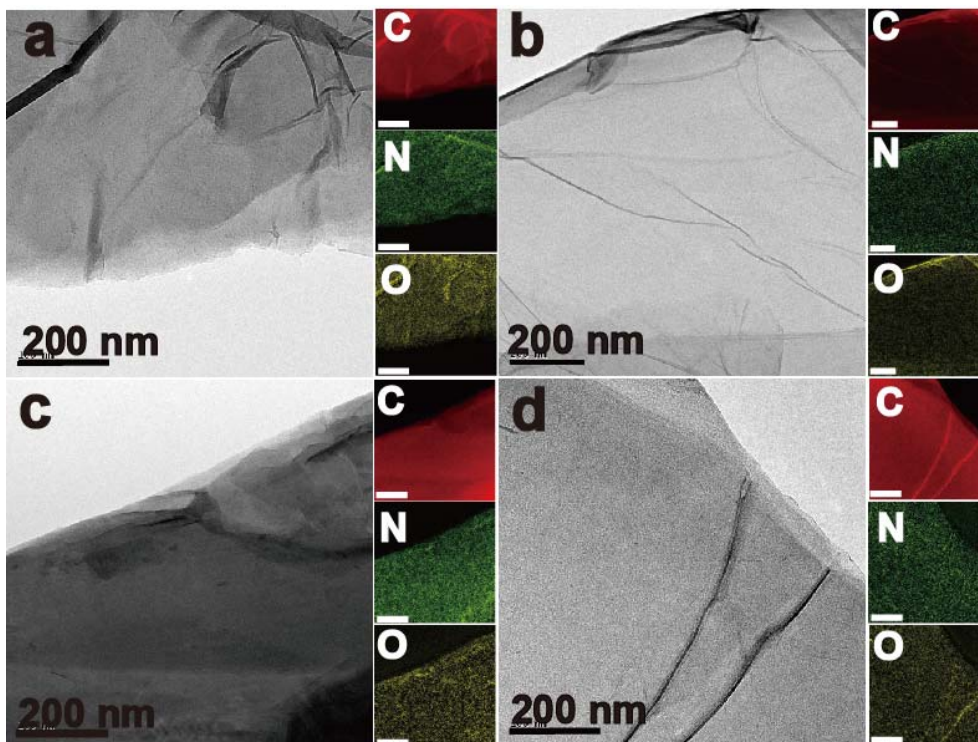


Figure S3 (a), (b), (c) and (d) TEM and EELS graphs of NG-300, NG-500, NG-700 and NG-900,  
respectively. All scale bars are 200 nm

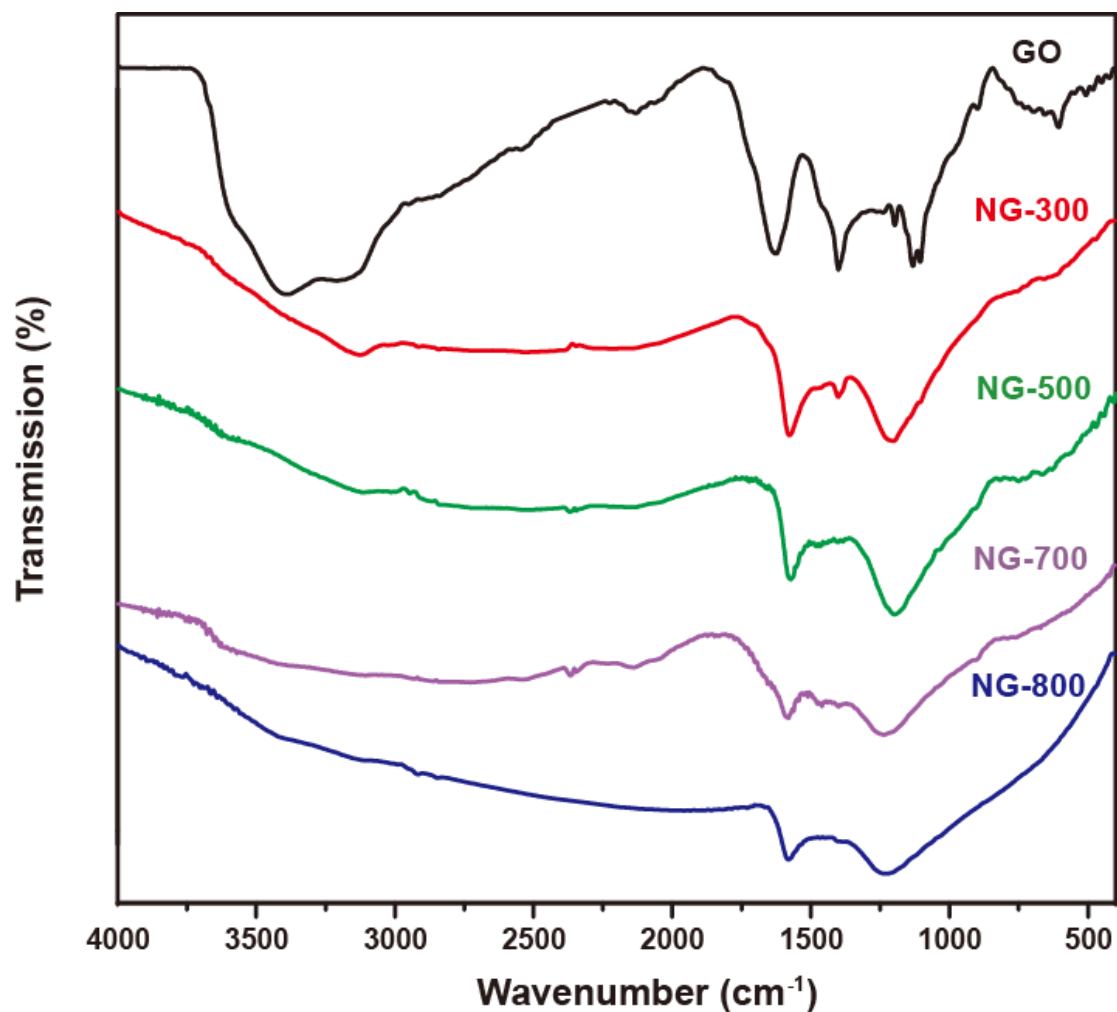


Figure S4 FTIR spectra of GO, NG-300, NG-500, NG-700 and NG-800, from top to bottom

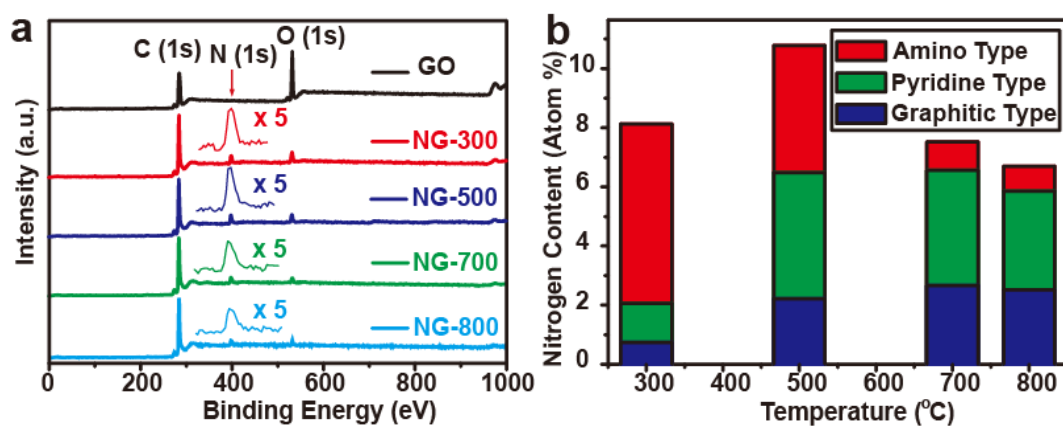


Figure S5 (a) XPS spectra of GO, NG-300, NG-500, NG-700 and NG-800. (b) Content of different nitrogen species in four N-doped samples.

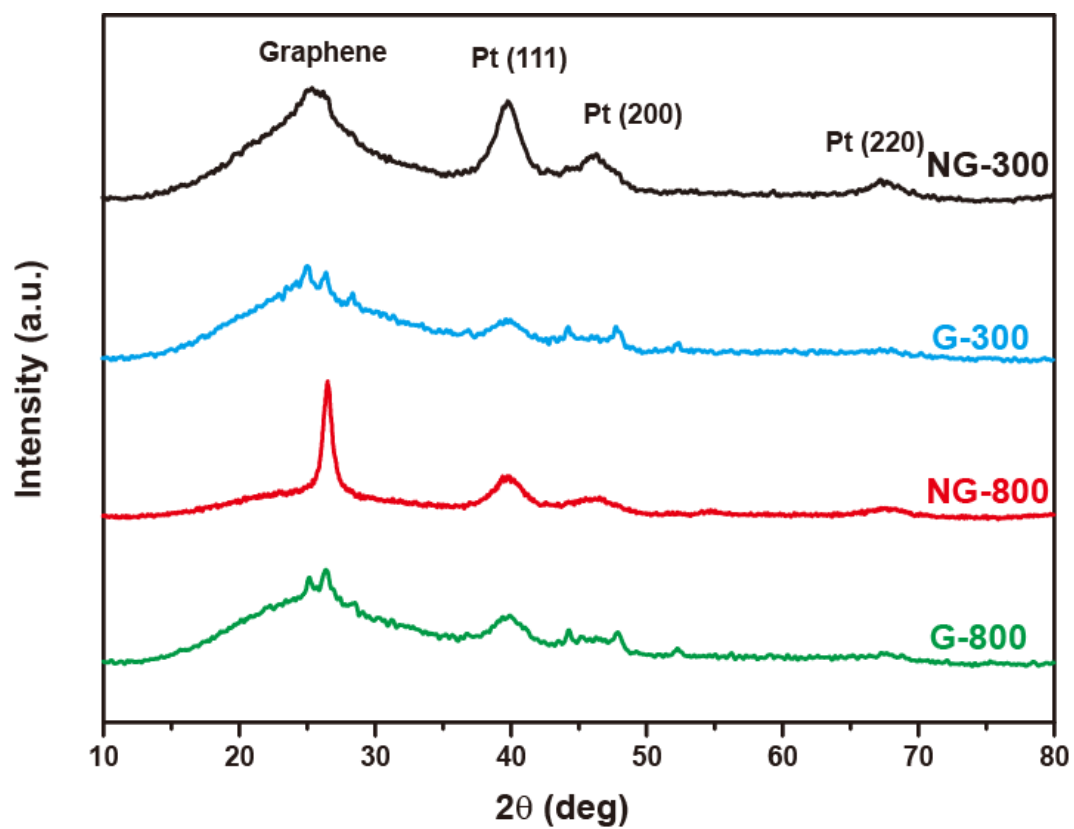


Figure S6 XRD spectra of NG-300, G-300, NG-800 and G-800

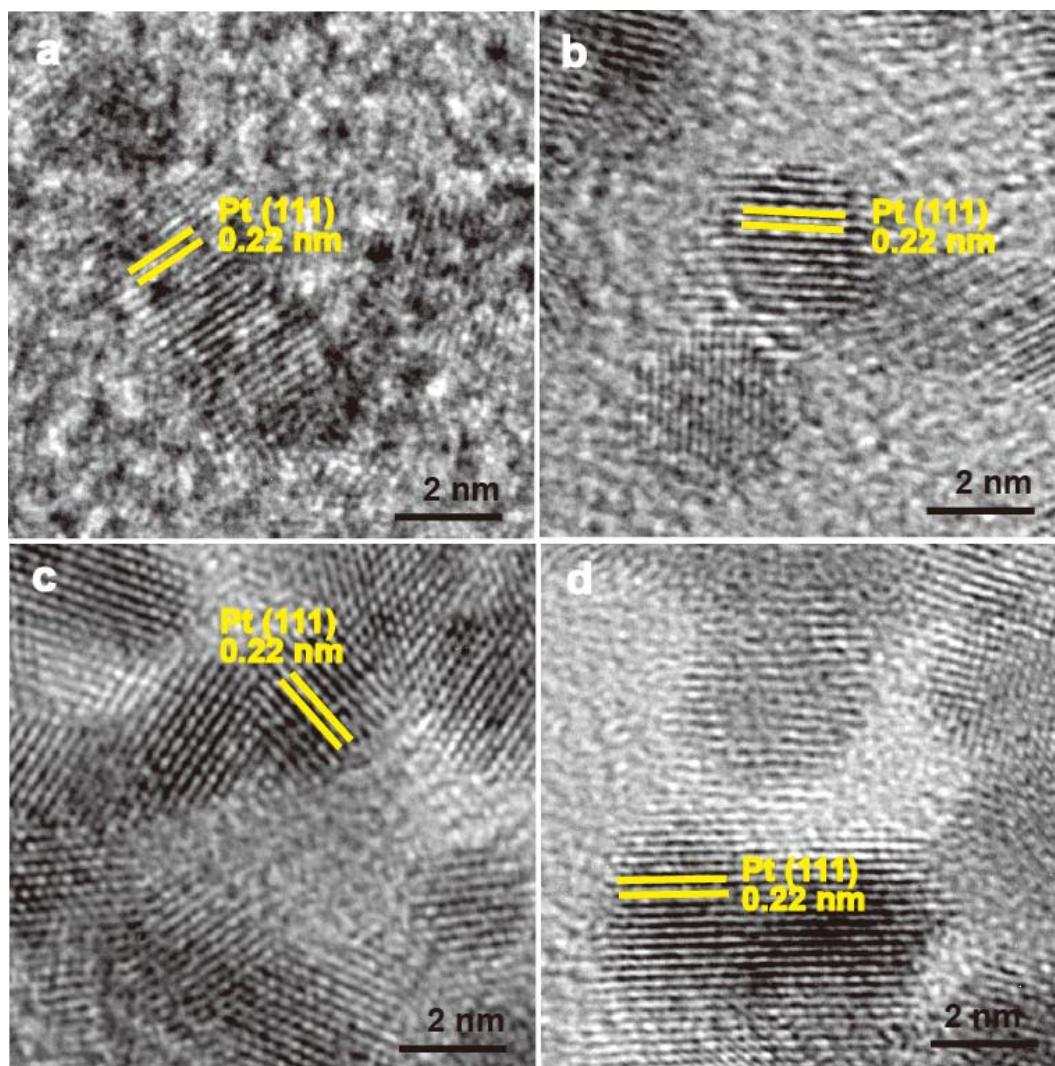


Figure S7 High resolution TEM image of (a) Pt/NG-300, (b) Pt/G-300, (c) Pt/NG-800, and (d) Pt/G-800.

Table S1 Resistance of NG-300, NG-800, G-300 and G-800

Samples	Resistance (logR)
NG-300	3.06
NG-800	2.42
G-300	3.21
G-800	2.89