

## **Electrochemical performance of annealed cobalt–benzotriazole/CNTs catalysts towards the oxygen reduction reaction**

Adina Morozan, Pascale Jégou, Bruno Josselme\* and Serge Palacin

CEA-Saclay, DSM/IRAMIS/SPCSI/LCSI, 91191 Gif-sur-Yvette Cedex, France

\*[bruno.josselme@cea.fr](mailto:bruno.josselme@cea.fr)

**Electronic Supplementary Information**

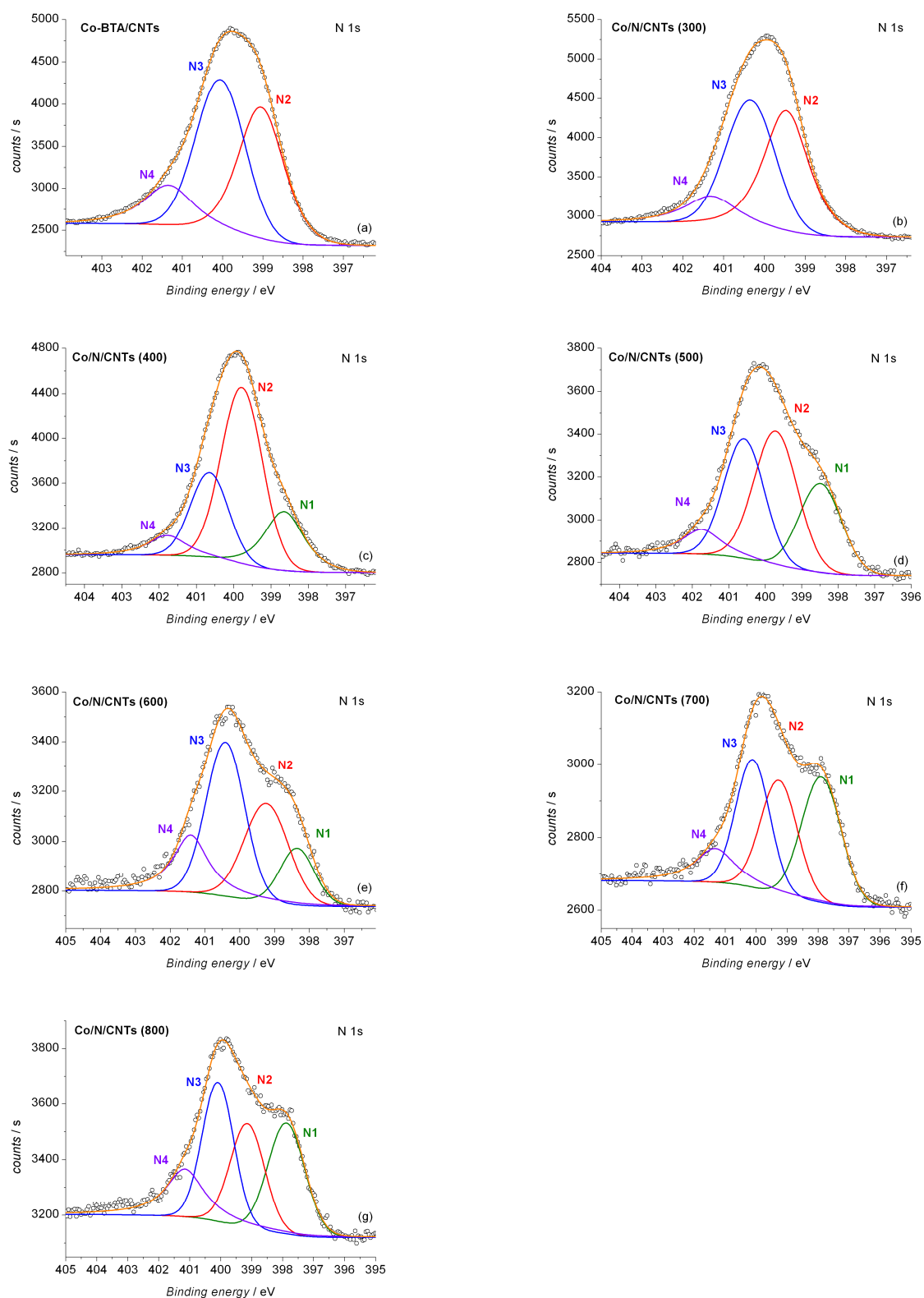


Figure S1. Decomposed XPS N1s spectra of the samples: a). Co-BTA/CNTs, b). Co/N/CNTs (300), c). Co/N/CNTs (400), d). Co/N/CNTs (500), e). Co/N/CNTs (600), f). Co/N/CNTs (700), and g). Co/N/CNTs (800).

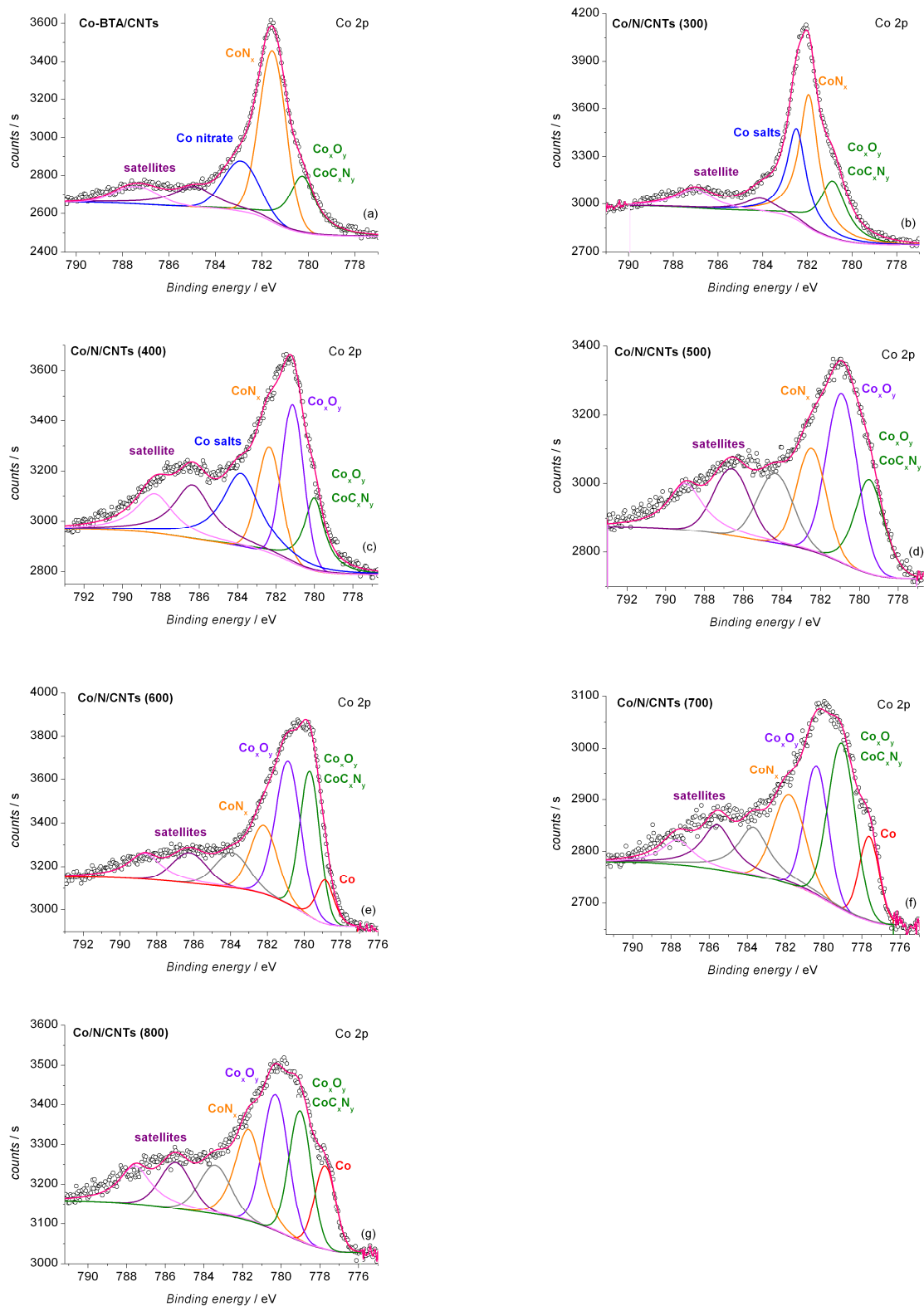


Figure S2. Decomposed XPS Co<sub>2p</sub> spectra of the samples: a). Co-BTA/CNTs, b). Co/N/CNTs (300), c). Co/N/CNTs (400), d). Co/N/CNTs (500), e). Co/N/CNTs (600), f). Co/N/CNTs (700), and g). Co/N/CNTs (800).

Table S1. Distribution of N species obtained from the decomposition of the N 1s peaks by XPS				
Sample	N-type			
	N1	N2	N3	N4
	pyridinic (BE/eV)	CoN <sub>x</sub> , nitrile (BE/eV)	pyrrolic (BE/eV)	triazole moiety, quaternary (BE/eV)
Co-BTA/CNTs	-	399.1	400.2	401.3
Co/N/CNTs (300)	-	399.5	400.3	401.3
Co/N/CNTs (400)	398.6	399.8	400.7	401.8
Co/N/CNTs (500)	398.5	399.7	400.6	401.7
Co/N/CNTs (600)	398.4	399.2	400.4	401.4
Co/N/CNTs (700)	397.9	399.3	400.1	401.3
Co/N/CNTs (800)	397.9	399.2	400.1	401.2

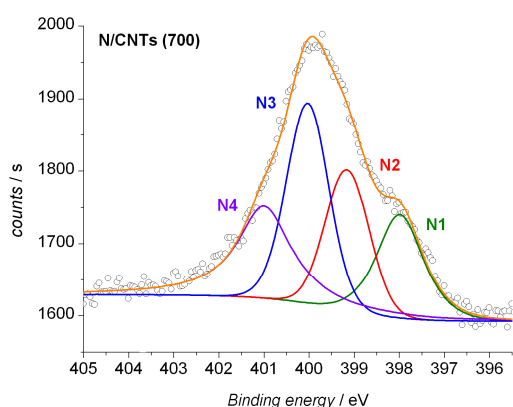


Figure S3. Decomposed XPS N1s spectrum of N/CNTs (700). (N2 correspond to nitrile groups)

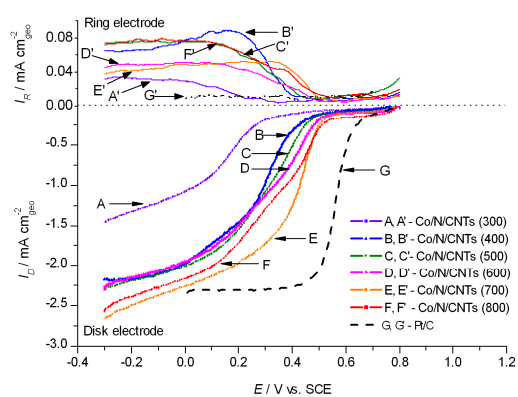


Figure S4. RRDE measurements of ORR on Co/N/CNTs catalysts (in the range of 300-800 °C) and Pt/C. The ring electrode was polarized at 1 V vs. SCE. Electrolyte: O<sub>2</sub>-saturated 0.5 M H<sub>2</sub>SO<sub>4</sub>, scan rate: 5 mV s<sup>-1</sup>, rotation speed: 500 rpm, and catalyst loading: 425 μg cm<sup>-2</sup> for Co/N/CNTs series and 81.50 μg<sub>Pt</sub> cm<sup>-2</sup> for Pt/C.