

Catalysts characterization

Oxygen thermogravimetry (O₂-TG) analysis was carried out in a Perkin-Elmer TGA7 thermogravimetric analyzer under pure oxygen atmosphere of 0.1 MPa and a ramp rate of 10 K/min. Data processing was done using a Pyris TGA7HT software package.

The N₂ adsorption-desorption isotherms were recorded on a TriStar II 3020 V1.03 instrument at 77 K. Before the measurement, the samples were evacuated at 473 K for 2 h. The total surface area was determined by the Braunauer-Emmett-Teller (BET) method.

Supported results

The thermal stability of the as-obtained sample was examined by Oxygen thermogravimetry (O₂-TG). CNT undergoes largely mass loss from around 450 °C. Cr-1.5 sample still shows good thermal stability, and the minimum temperature of largely mass decrement is from around 420 °C.

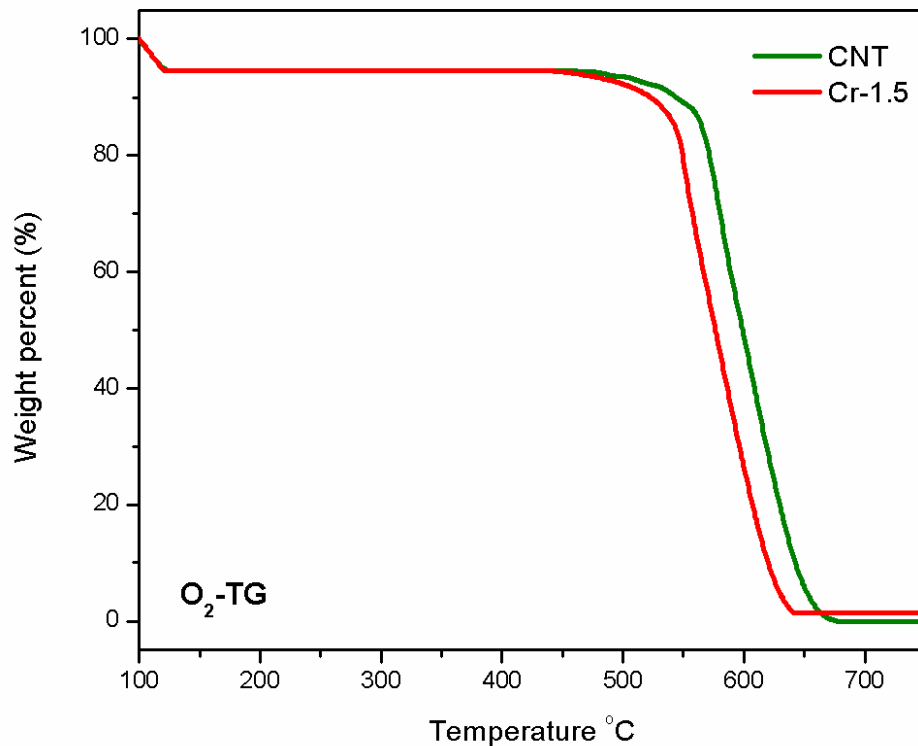


Fig. S1 O₂-TG result of CNT, Cr-1.5

CNT and Cr-1.5 exhibit similar N₂-adsorption isotherms (Fig. S2). Following BET analysis method, the total pore volume of the two samples were identical (CNT: 1.25 cm³/g; Cr-1.5: 1.25 m³/g), whereas the surface area decreases a little bit after Cr decorating (CNT: 232 m²/g; Cr-1.5: 214 m²/g). It indicates that Cr might not be incorporated into the CNT channel, but only on the outside of the walls.

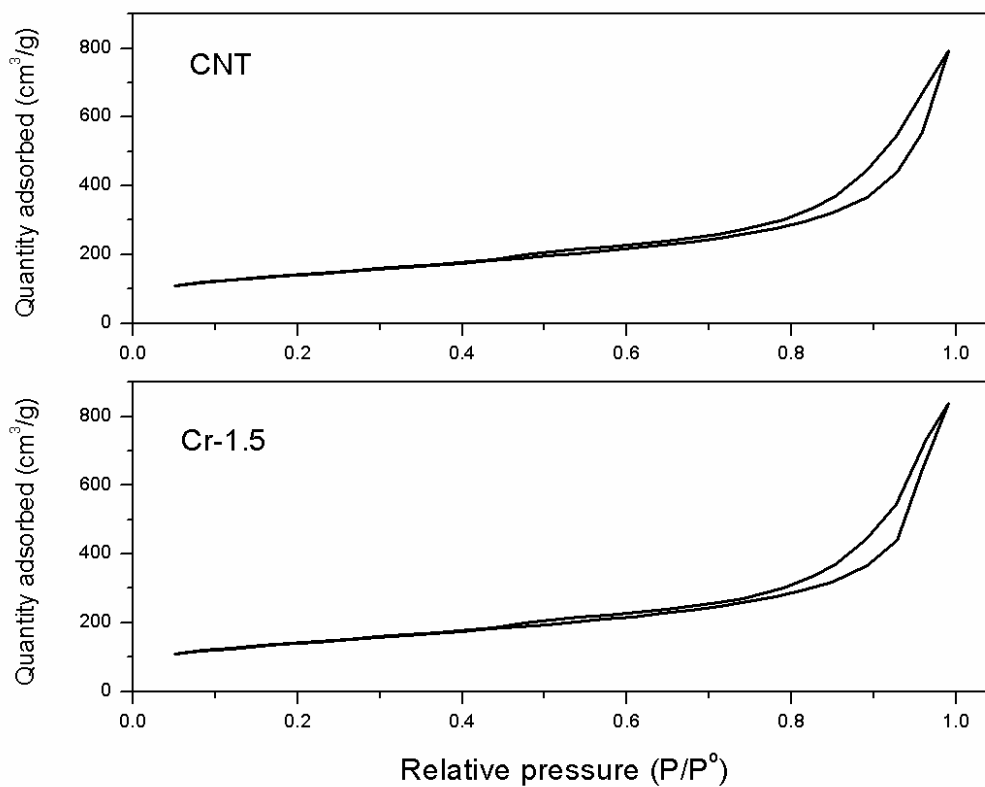


Fig. S2 N₂ adsorption isotherms of CNT, Cr-1.5

As CNT was grown on the supported Ni-MgO catalyst in the preparation process, XPS was implemented to test the situation of our samples. The XPS analysis shows the absence of Mg or Ni residue on the surface.

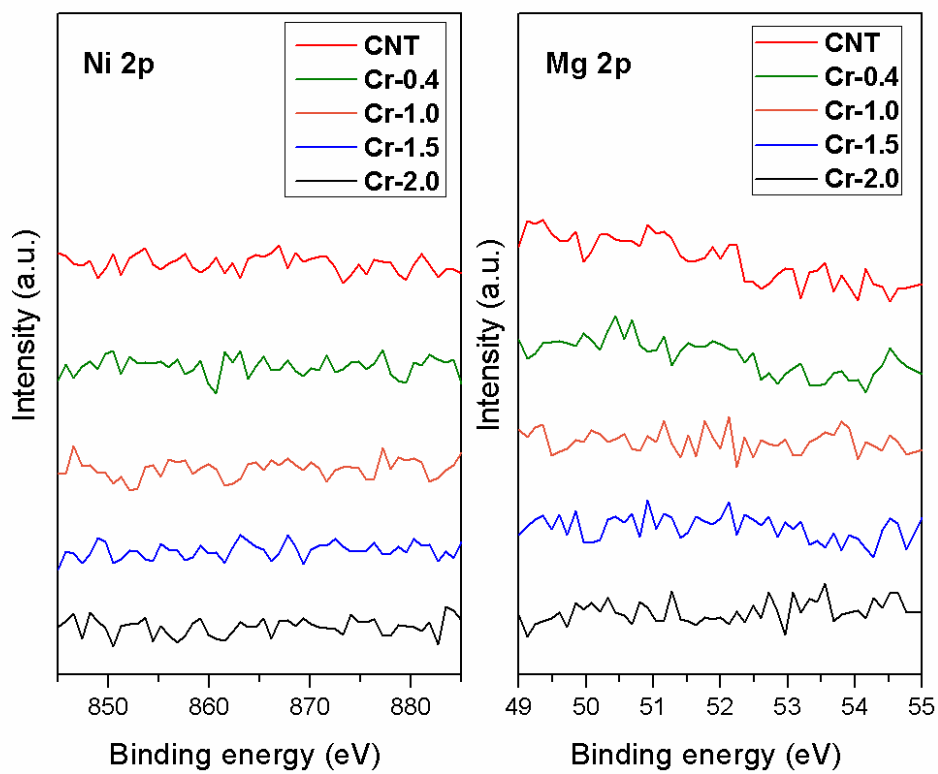


Fig. S3 XPS profiles of Ni 2p and Mg 2p for all samples.