

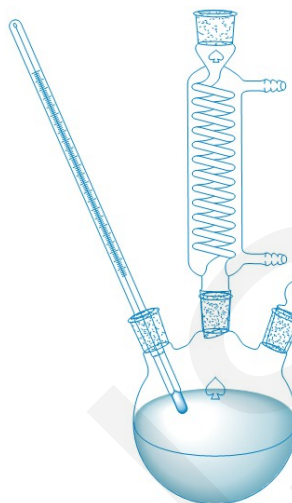
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Syntheses and characterizations of alloyed $\text{Co}_x\text{Ni}_{1-x}\text{O}$ nanocrystals

Key words:

Alloying, Nickel oxide, Cobalt oxide, Colloidal nanocrystals

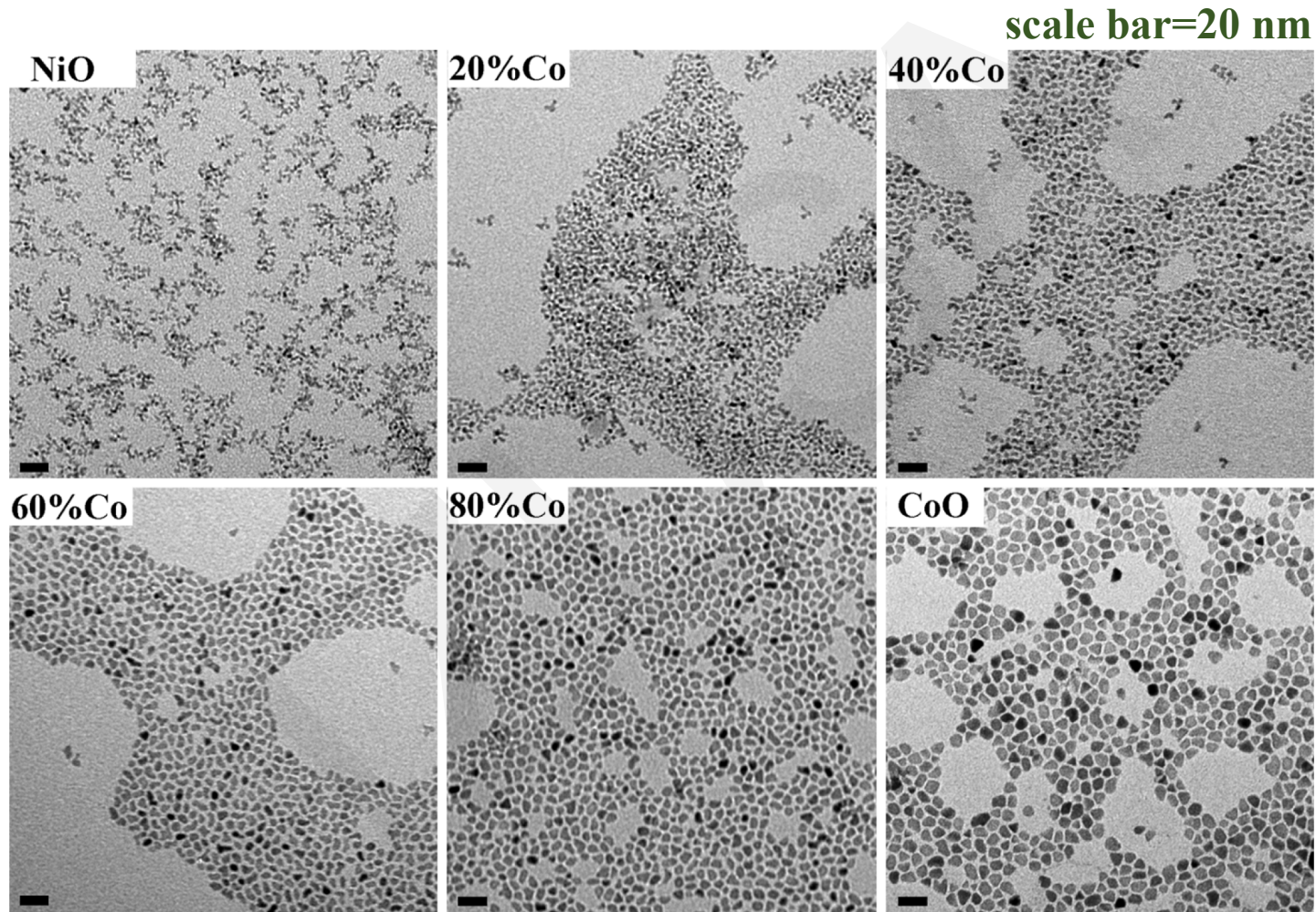




$\text{Ni(St)}_2 + \text{Co(St)}_2 + \text{LiSt} + \text{ODA} + \text{ODE}$

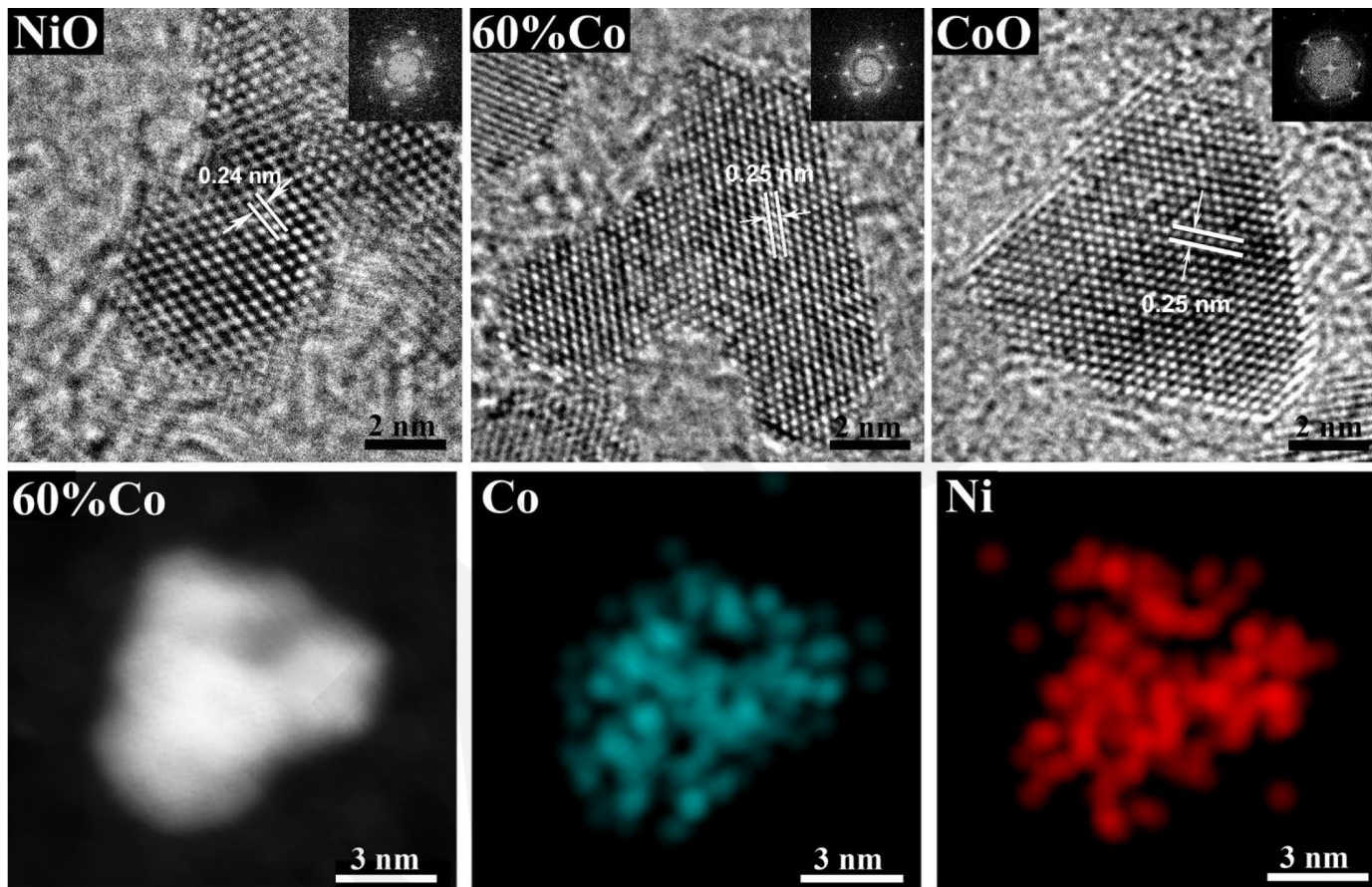


Shape control



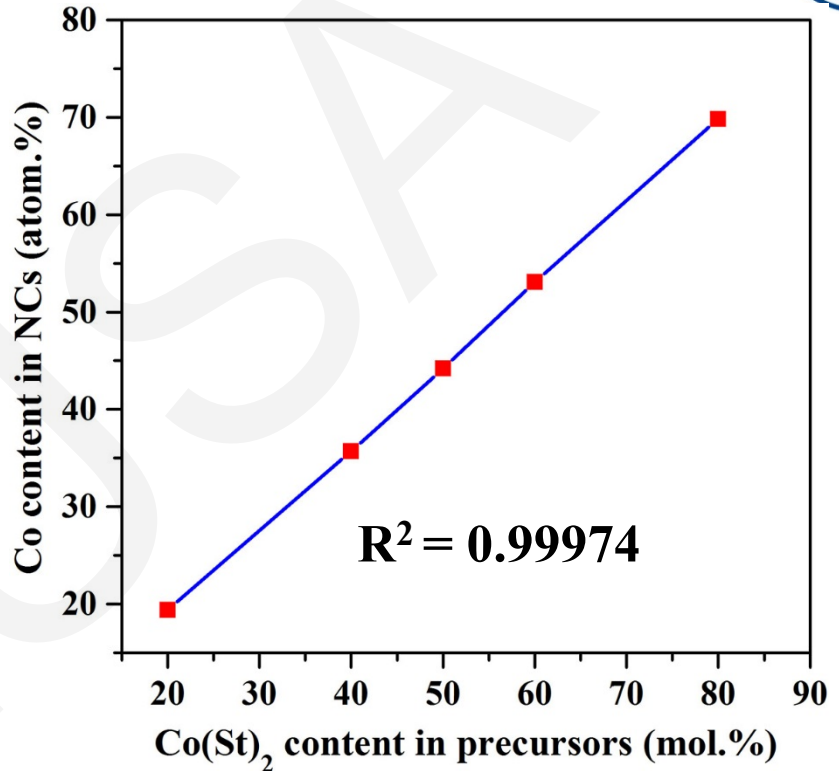
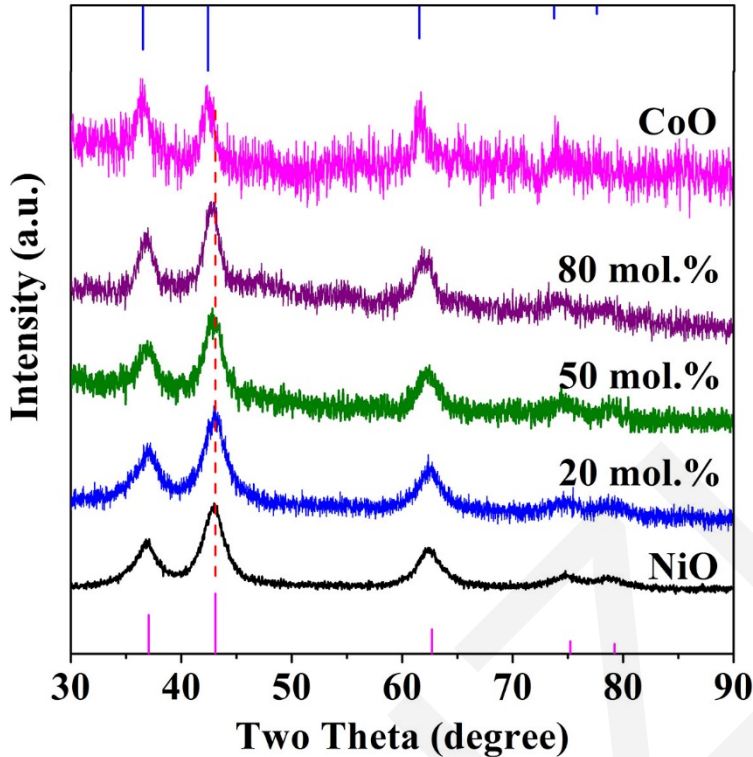
nanoclusters → V-shaped nanocrystals → isolated nanoparticles

Crystal structures and elemental distributions



- NiO, $\text{Co}_x\text{Ni}_{1-x}\text{O}$, and CoO nanocrystals show cubic rock salt structure
- Co and Ni elements are homogeneously distributed in the alloyed nanocrystals

Evolutions of crystal structures and compositions



- The crystal structures of all oxide nanocrystals match the face-centered cubic structure
- The content of cobalt in the alloyed nanocrystals has a linear correlation with the molar ratio of Co(St)₂ in the reagents

➤ Ni

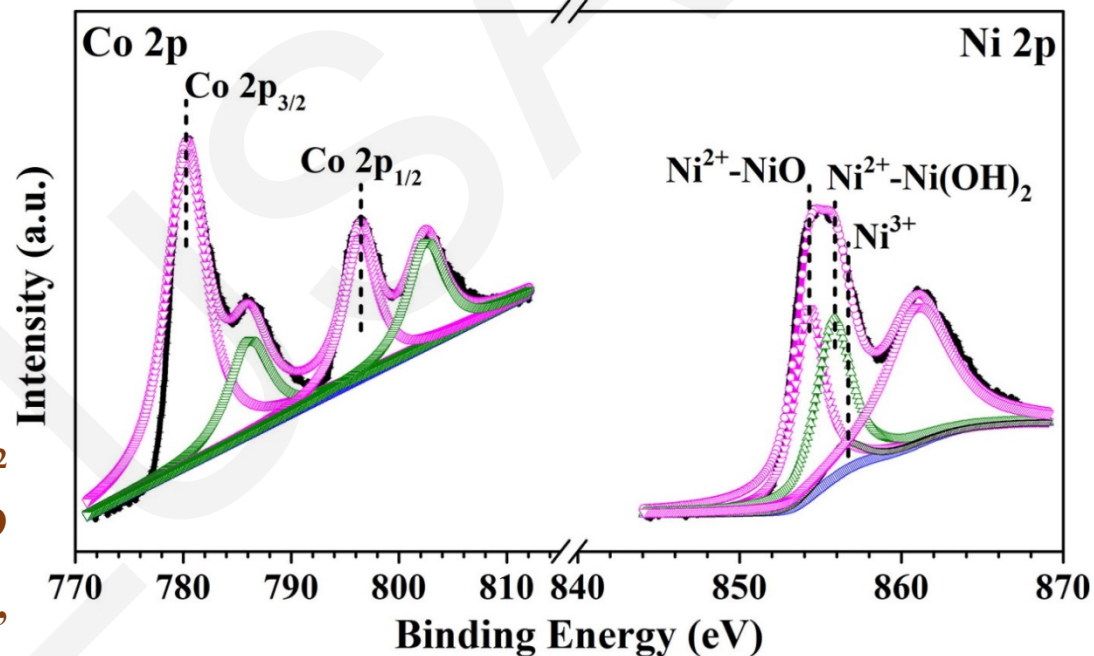
The existence of Ni(OH)_2 and NiO

Trace amount of Ni^{3+} is detected .

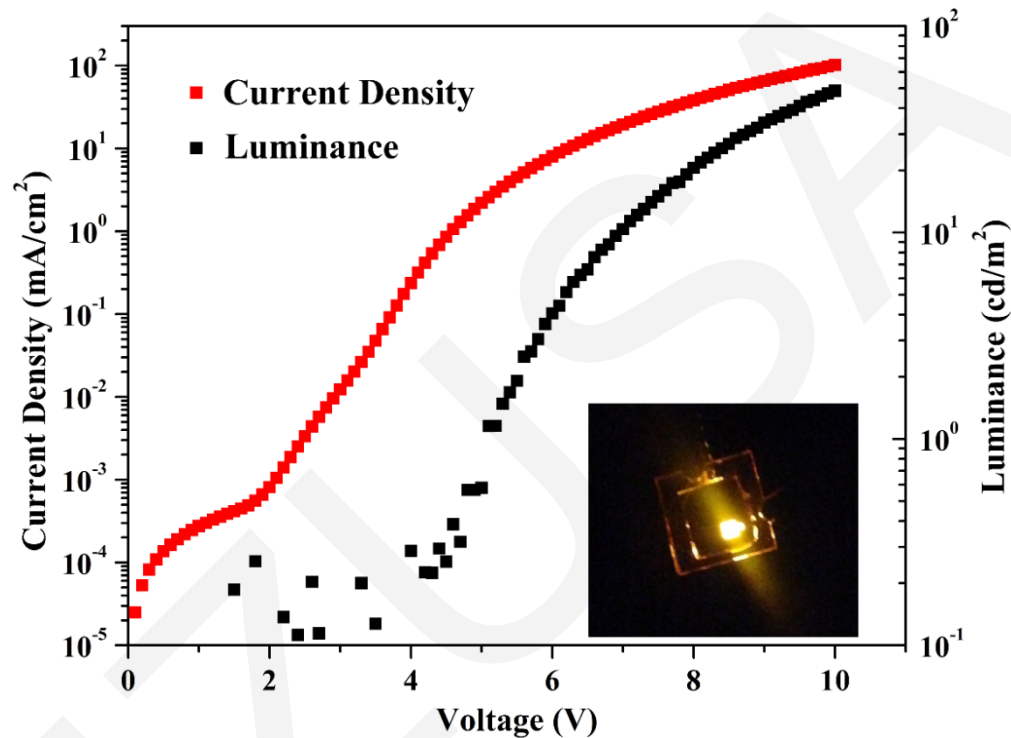
➤ Co

$\text{Co}2p_{1/2}$ satellite peak:

The intensity ratio of $\text{Co } 2p_{1/2}$ satellite peak to main peak was ~ 0.9 in CoO and ~ 0.3 in Co_3O_4 , respectively.



PLEDs Based on MEH-PPV Emissive Layers



- A model system of ITO/Co_xNi_{1-x}O/MEH-PPV/Ca/Al is used to confirm that the Co_xNi_{1-x}O nanocrystals can act as an effective hole-transporting material.

Conclusions



- We demonstrated the syntheses of quality alloyed $\text{Co}_x\text{Ni}_{1-x}\text{O}$ ($x=0\sim 1$) nanocrystals by the protecting-ligand assisted approach.
- The composition-dependent morphologies and crystal structures of the alloyed $\text{Co}_x\text{Ni}_{1-x}\text{O}$ nanocrystals can transform from NiO-dominated to CoO-dominated characteristics.
- EDS mapping results indicate homogeneous distributions of Ni and Co atoms within the nanocrystals.
- Our study provides a good example for the syntheses of alloyed oxide nanocrystals with continuously tunable compositions.