

Supporting information

The unexpected structures of “core-shell” and “alloy” LnF_3 nanoparticles as examined by variable energy X-ray photoelectron spectroscopy

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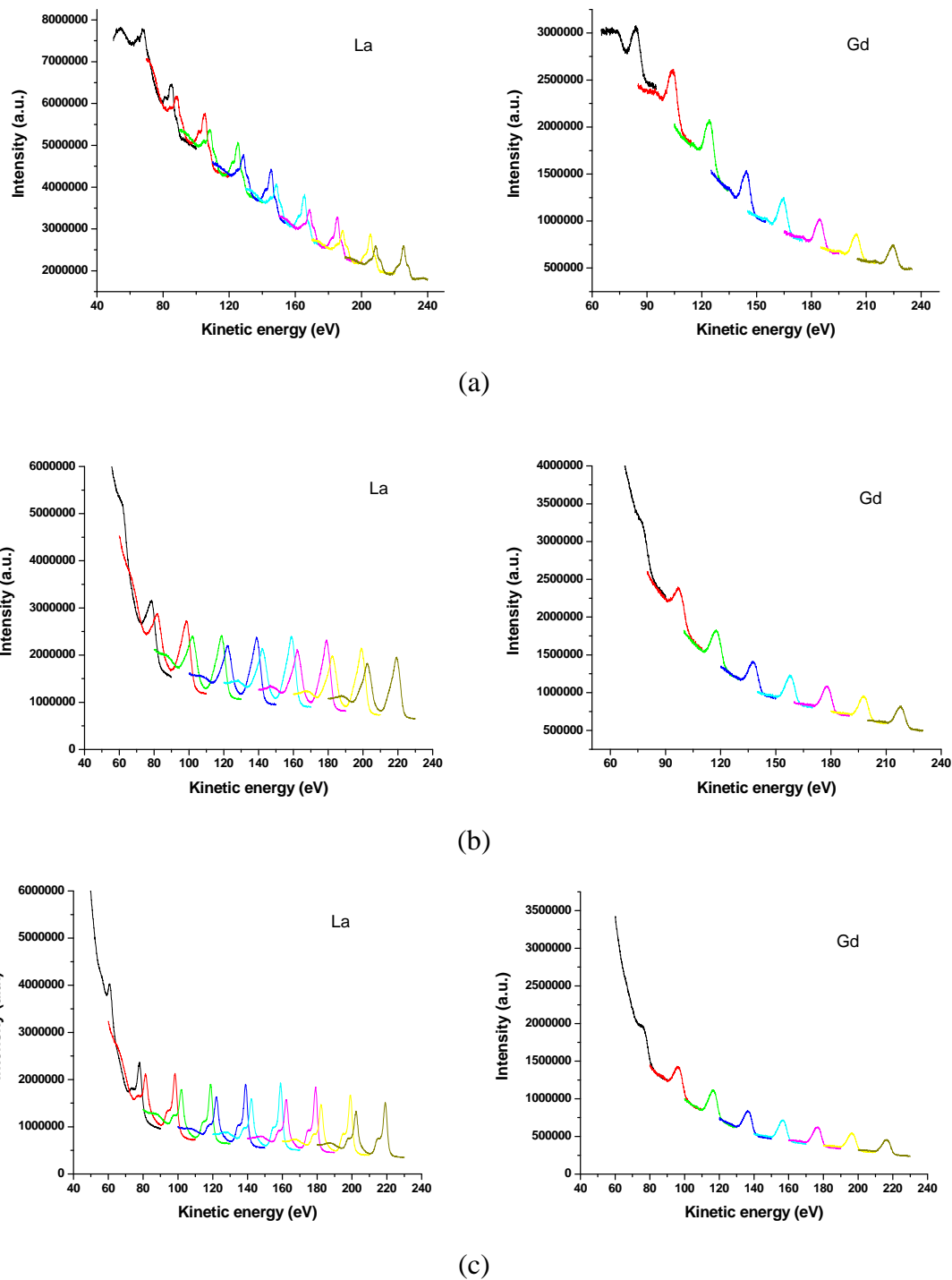


Fig. S1 Raw XPS spectra of (a) LaF₃-GdF₃ “core-shell” nanoparticles, (b) GdF₃-LaF₃ “core-shell” and (c) LaF₃/GdF₃ “alloy” nanoparticles.

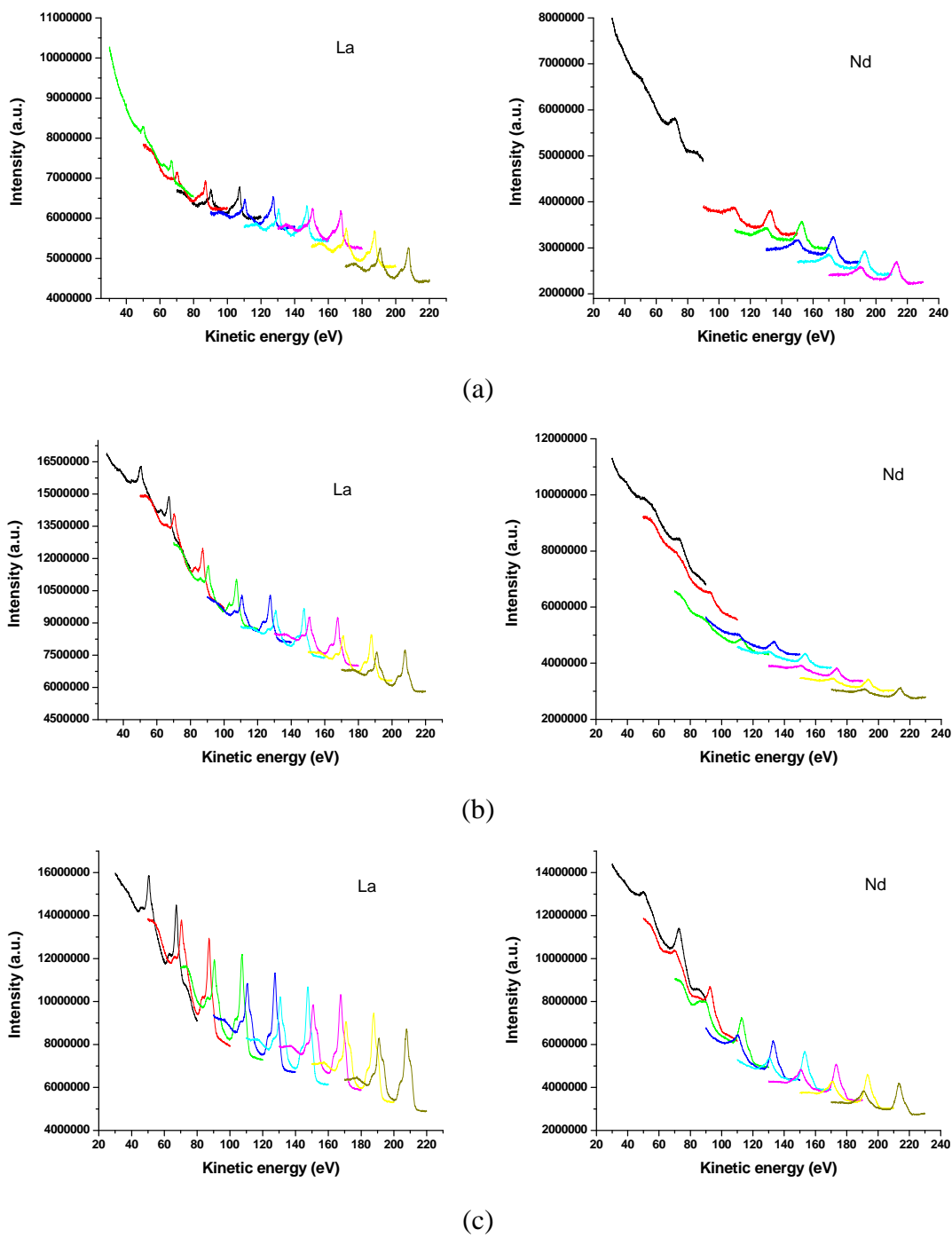
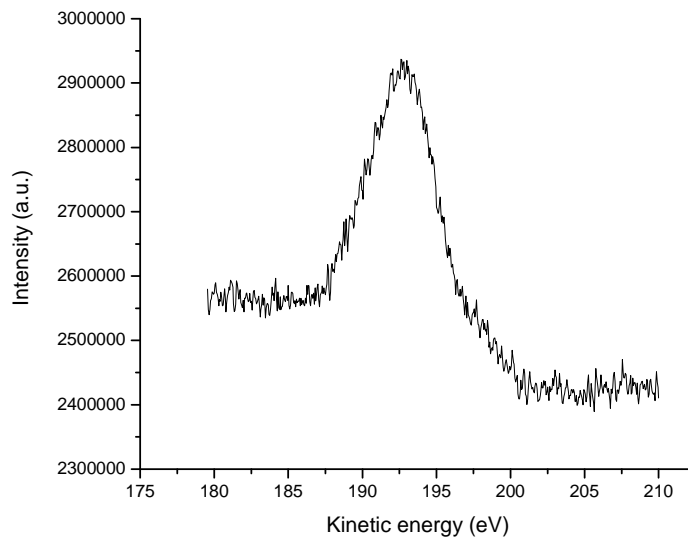
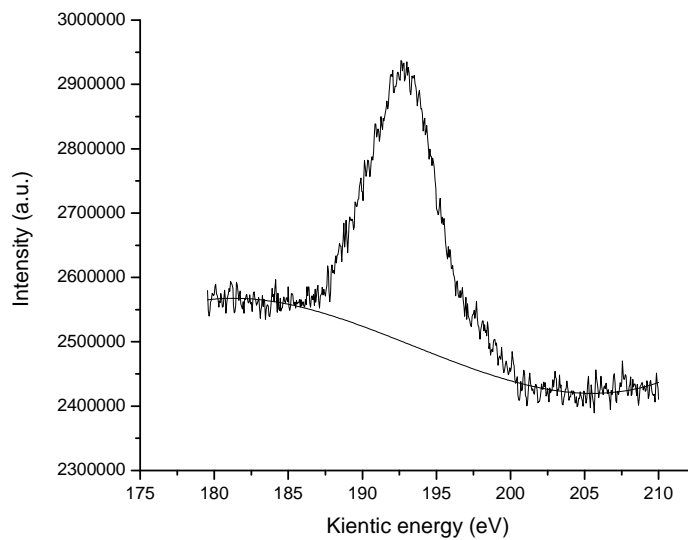


Fig. S2 Raw XPS spectra of (a) $\text{LaF}_3\text{-NdF}_3$ “core-shell”, (b) $\text{NdF}_3\text{-LaF}_3$ “core-shell” and (c) $\text{LaF}_3/\text{NdF}_3$ alloy nanoparticles

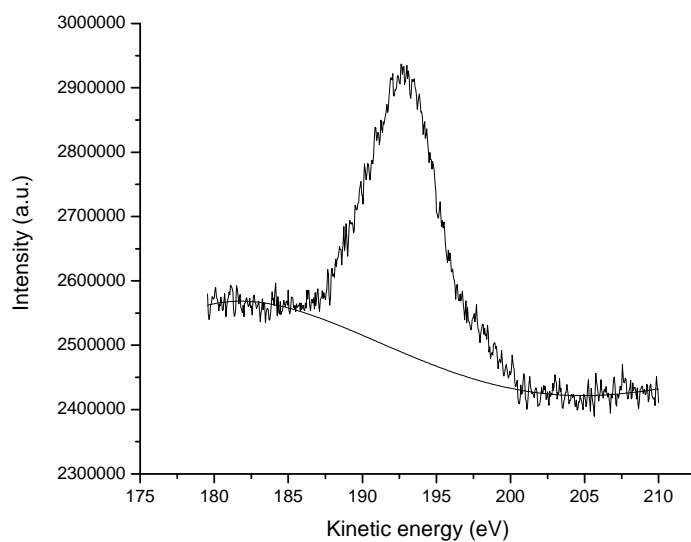
Sample of XPS data processing.



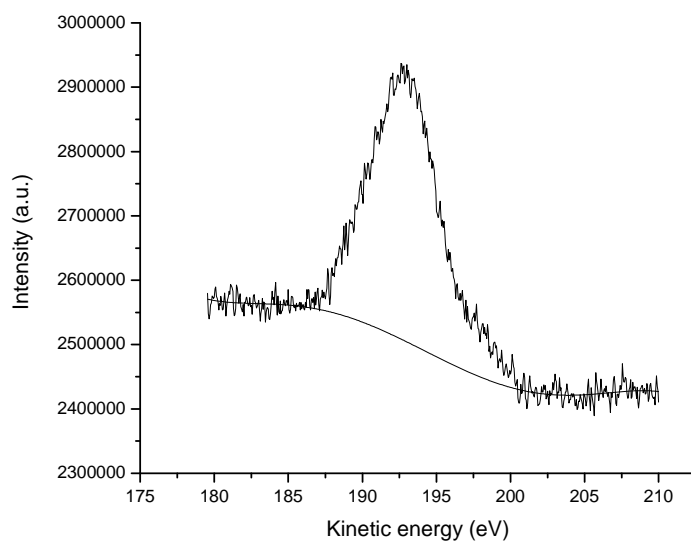
(a) Raw spectrum



(b1) third-order polynomial fit

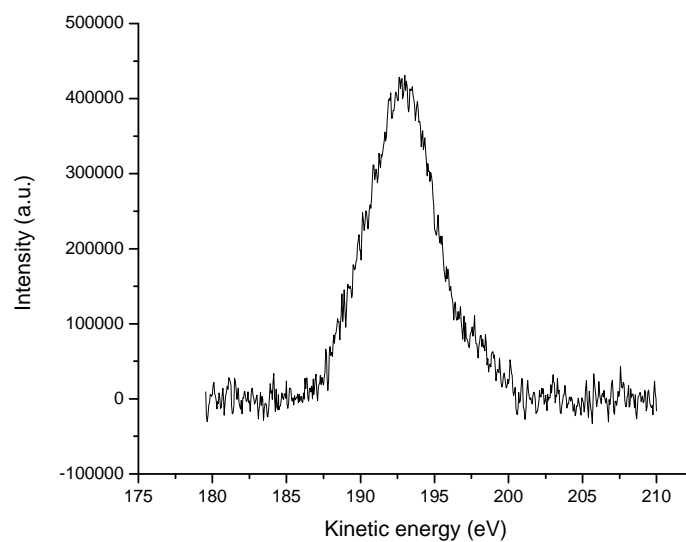


(b2) fourth-order polynomial fit

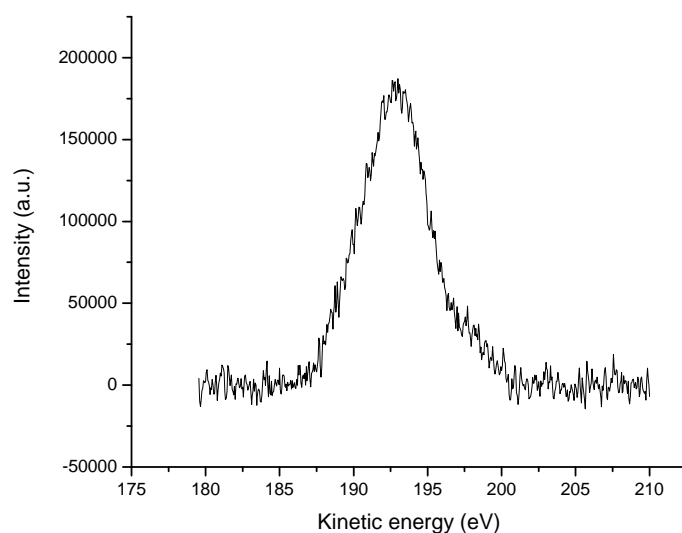


(b3) fifth-order polynomial fit

(b) Three different polynomial background fits



(d) After a background removal



(e) After corrections of beam intensity and photoionization cross section

Fig. S3 Sample processing of XPS data.

After all the above steps for all the original spectra, intensities were integrated, and then intensity ratio of two lanthanides was applied to plot against kinetic energy to determine the structure of nanoparticles.