A Simple Method to Synthesize Dy(OH)₃ and Dy₂O₃ Nanotubes

Supporting Information

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Supporting Information 1 Powder X-ray diffraction pattern (XRD) (left) and scanning electron microscopic (SEM) image (right) of the starting raw material of bulky Dy₂O₃ crystals.

Supporting Information 2 Thermogravimetry trace and differentiate thermogravimetry trace (inset) of the as-synthesized $\text{Dy}(\text{OH})_3$ products. Thermogravimetry analysis was performed on a Netzsch TG-209 thermogravimeter.

Supporting Information 3 TEM image of the embedded as-synthesized $\text{Dy}(\text{OH})_3$ sample shows the cross sections of nanotubes, confirming that these nanotube are really empty. The samples were embedded in epoxy resin, and ultramicrotomed for TEM measurements.

Supporting Information 4 XRD pattern (top) of the as-synthesized $\text{Ho}(\text{OH})_3$ nanotubes under hydrothermal treatment at 160 °C for 48 h using bulky Ho_2O_3 crystals as the starting material. Transmission electron microscopic (TEM) image (a) of a single $\text{Ho}(\text{OH})_3$ nanotube with outer diameter of 53 nm and inner diameter of 16 nm. A selected area electron diffraction (SAED) pattern (b) taken from a single nanotube can be indexed as a pure hexagonal $\text{Ho}(\text{OH})_3$ single crystal recorded from the [010] zone axis. The as-synthesized $\text{Ho}(\text{OH})_3$ nanotubes were calcined to produce Ho_2O_3 nanotubes at 450 °C for 6 h in air. A TEM image of the Ho_2O_3 nanotubes is shown in (c). The SAED pattern (d) taken from a single Ho_2O_3 nanotube can be indexed as a cubic Ho_2O_3 single crystal recorded from the [011] zone axis.