

Supplementary Information for

“Green synthesis of monodispersed LaCO₃OH microgears with novel plum blossom-like structure via a glycerol-mediated solvothermal method”

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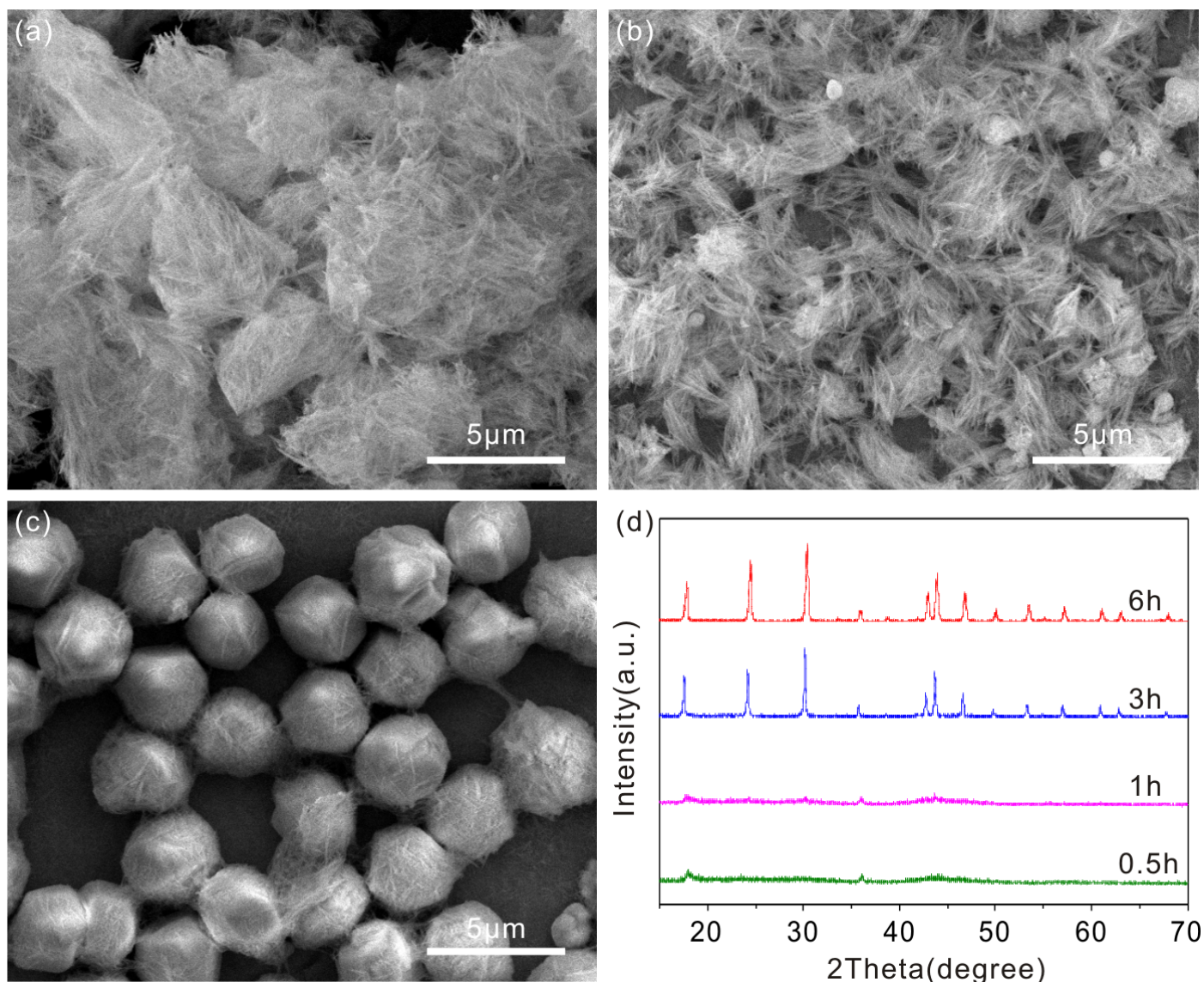


Figure S1. SEM images of Sample 1 collected at different reaction times: (a) 0.5 h, (b) 1 h, (c) 3 h. (d) XRD patterns of the products above. (Sample 1: 15 mL water, 15ml glycerol, 0.25g Lanthanum(III) nitrate hexahydrate , 0.017mole urea and T=200 °C)

In these parts, the volume ratio of water to glycerol, the concentration ratio of Lanthanum(III) nitrate hexahydrate to urea and reaction temperature are fixed at 15mL/15ml, 0.25g/0.017mole and 200°C, respectively. Figure S1(a) and (b) show that some short wires are prepared when the reaction time is about 30 min and 1h, respectively. By increasing the reaction time to 3 h, there are some sphere-like products composed of short rods appearing (Figure S1(c)). Further prolonging the reaction to 6 h, the pure sphere-like products are obtained and the short rods are disappearing (Figure 3(a) and (b)). The corresponding XRD patterns of the intermediate products obtained at different reaction times are shown in Figure S1 (d). The peaks from products are weak in the XRD pattern for the reaction of 30min and 1h. As the reaction time is extended to 3h and 6h, it is clear that the products can be assigned to the pure LaCO₃OH hexagonal phase

(JCPDS NO. 26-0815).

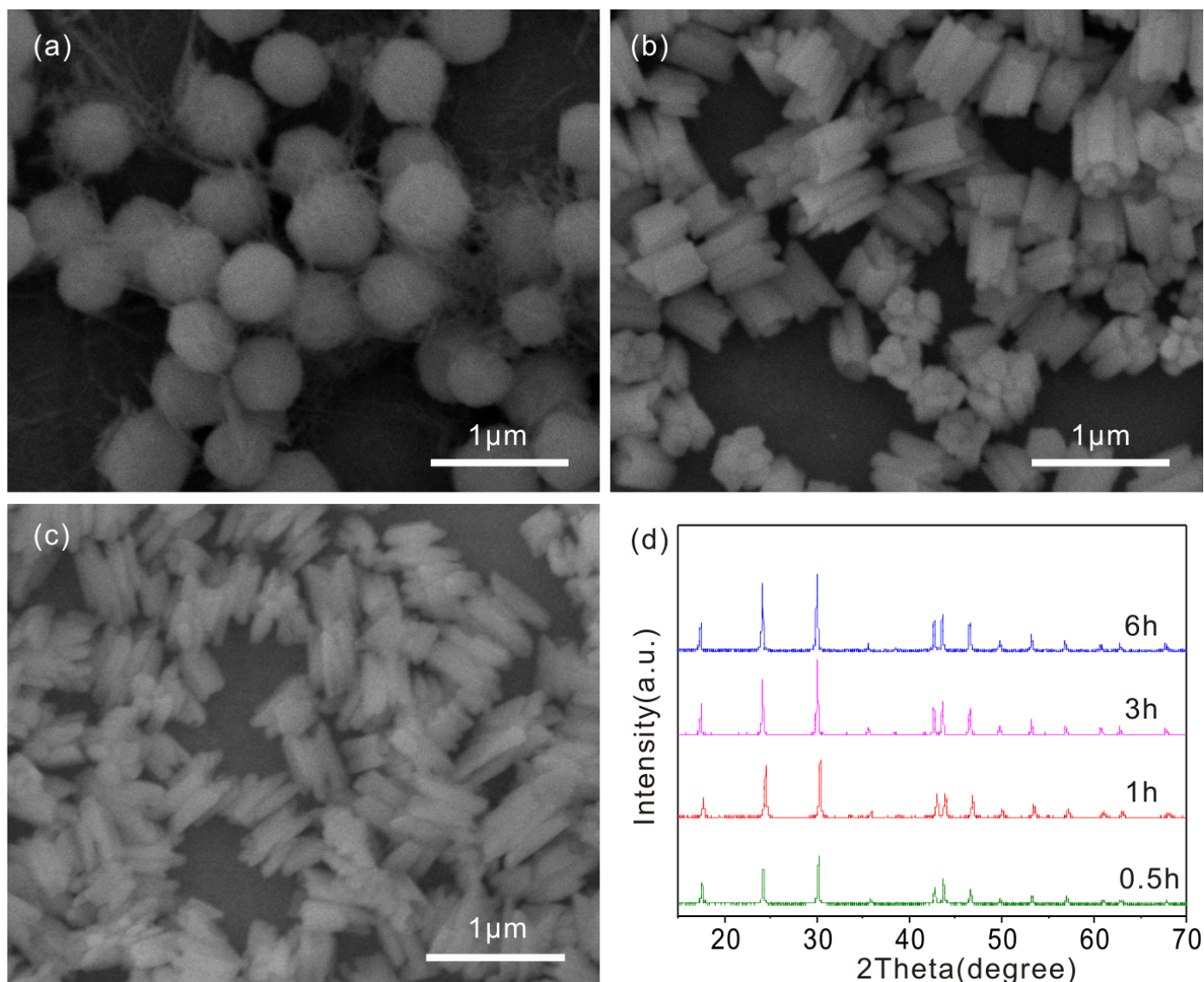


Figure S2. SEM images of Sample 3 collected at different reaction times: (a) 0.5 h, (b) 1 h, (c) 3 h. (d) XRD patterns of the products above. (Sample 3: 15mL water, 15ml glycerol, 0.25g Lanthanum(III) nitrate hexahydrate, 0.067mole urea and T=200 °C)

In these experiments, the volume ratio of water to glycerol, the concentration ratio of Lanthanum(III) nitrate hexahydrate to urea and reaction temperature are fixed at 15mL/15ml, 0.25g/0.067mole and 200°C, respectively. Figure S2(a) shows that some sphere-like products composed of rod are prepared after 30 min duration. By increasing the reaction time to 1 h, the microgears are obtained although the teeth of the microgears become thin (Figure S2 (b)). The length of the microgears is about 900nm. Further prolonging the reaction to 3 and 6 h, the microgears with glomeroplastic texture are produced (Figure 3(c) and (d)). The corresponding XRD patterns of the intermediate products obtained at different reaction times are shown in Figure S2 (d). It is shown that the peaks from products can be assigned to the pure LaCO₃OH hexagonal

phase (JCPDS NO. 26-0815).

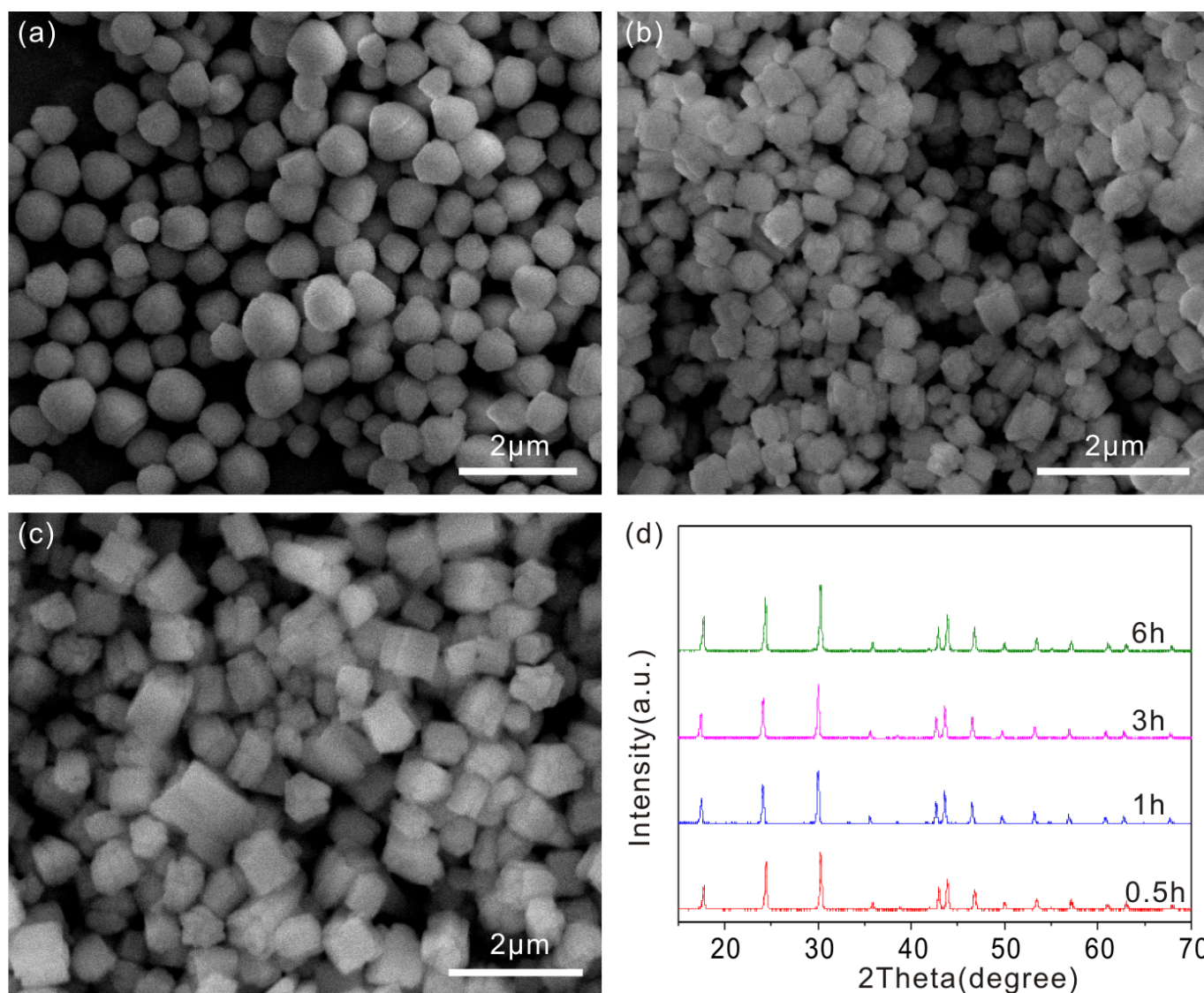


Figure S3. SEM images of Sample 4 collected at different reaction times: (a) 0.5 h, (b) 1 h, (c) 3 h. (d) XRD patterns of the products above. (Sample 4: 10mL water, 20ml glycerol, 0.25g Lanthanum(III) nitrate hexahydrate, 0.034mole urea and T=200 °C)

In these sections, the volume ratio of water to glycerol, the concentration ratio of Lanthanum(III) nitrate hexahydrate to urea and reaction temperature are fixed at 10mL/20ml, 0.25g/0.034mole and 200°C, respectively. Figure S3 (a) shows that sphere-like particles are prepared after 30 min duration. By increasing the reaction time to 1 h, 3h and 6h, the morphology changed from sphere-like, to sphere with many faces, to microgears (Figure S3 (b), (c) and Figure 4 (a) and (b)). The corresponding XRD patterns of the intermediate products obtained at different reaction times are shown in Figure S3 (d). The peaks from products are weak in the XRD pattern for the reaction of 30min. As the reaction time is extended to 1h, 3h and 6h, the peaks from products become stronger that that of the products obtained at 30min. The peaks of the products can be assigned to the pure LaCO₃OH hexagonal phase (JCPDS NO. 26-0815).

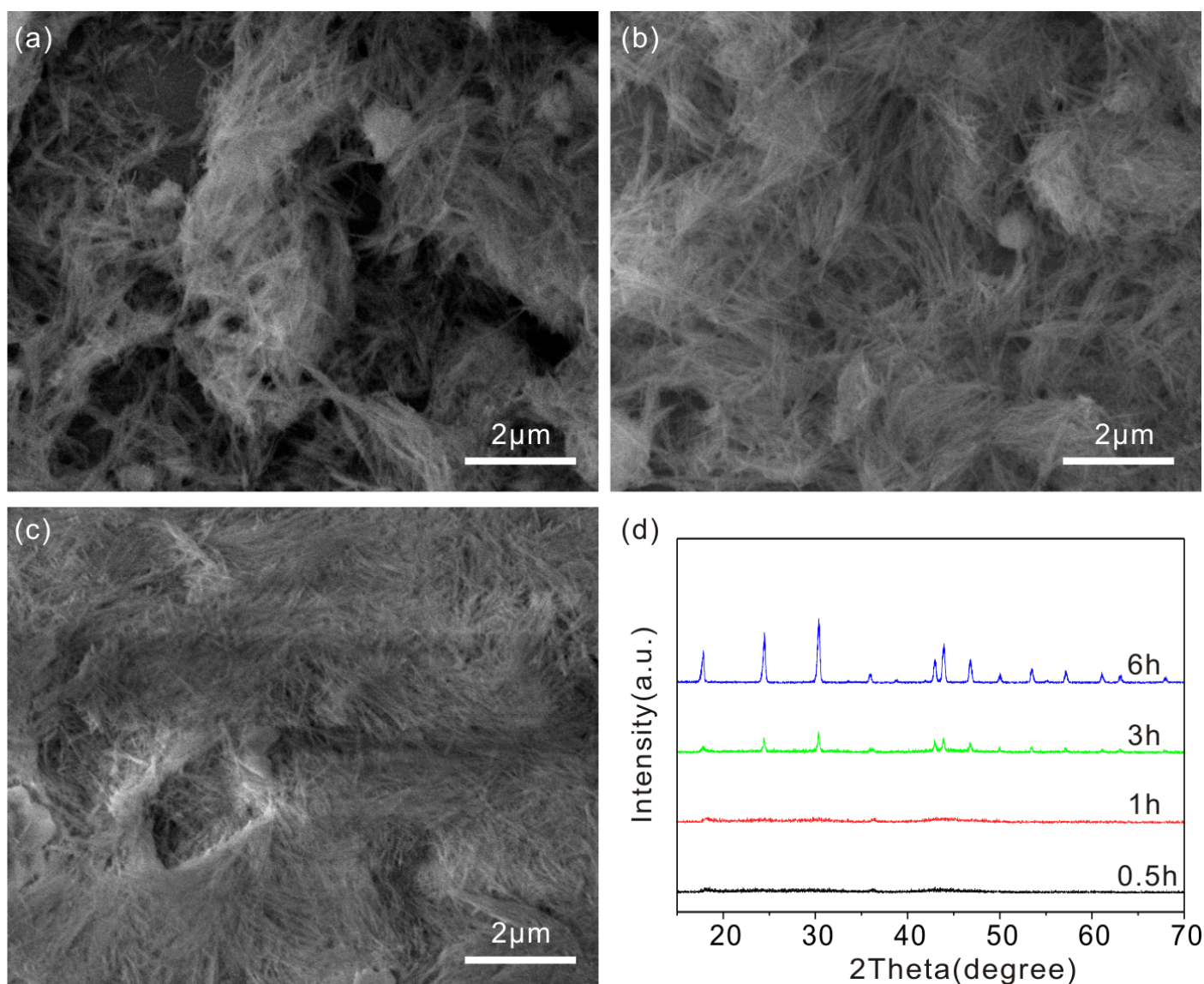


Figure S4 SEM images of Sample 5 collected at different reaction times: (a) 0.5 h, (b) 1 h, (c) 3 h. (d) XRD patterns of the products above. (Sample 5: 20mL water, 10ml glycerol, 0.25g Lanthanum(III) nitrate hexahydrate, 0.034mole urea and $T=200\text{ }^{\circ}\text{C}$)

In these experiments sections, the volume ratio of water to glycerol, the concentration ratio of Lanthanum(III) nitrate hexahydrate to urea and reaction temperature are fixed at 20mL/10ml, 0.25g/0.034mole and $200\text{ }^{\circ}\text{C}$, respectively. When the reaction time is 1 h, 3h and 6h, there are a large number of wires appearing in the products, as shown in Figure S4 (a-c). By increasing the reaction time to 6h, the products are rods of 900 nanometers in length and about 80nm in diameter (Figure 4 (c) and (d)). The corresponding XRD patterns of the intermediate products obtained at different reaction times are shown in Figure S4 (d). The peaks from products are weak in the XRD pattern for the reaction of 30min, 1h and 3h. As the reaction time is extended to 6h, the stronger peaks from products can be assigned to the pure

LaCO₃OH hexagonal phase (JCPDS NO. 26-0815).