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Short Hydrogen Bonds on Reconstructed Nanocrystal Surface Enhance Oxygen Evolution Activity

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‡ A B B C 94720
§ D B B C 94720
¤ D E C 10900 E A C
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¶ E C E D A A I
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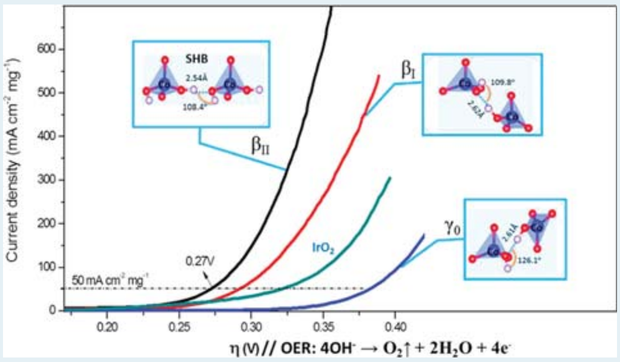
Supporting Information

ABSTRACT: ... β_{II} β_I γ_0 Li_2CoSiO_4 ... IrO_2 ...



KEYWORDS: β_{II}-Li_2CoSiO_4, nanocrystal surface, short hydrogen bond, proton transfer and dissociation, oxygen evolution activity

■ INTRODUCTION

... OER ... [1−3] ... η [4] ... OER ... IrO_x ... [6−1] ... [6,7] [8] [9] [10] [11] [12] ...

... [13] ... [14] ... H_2O OH^- O−H O=O O_2 [4] ... OER ... [8] ...

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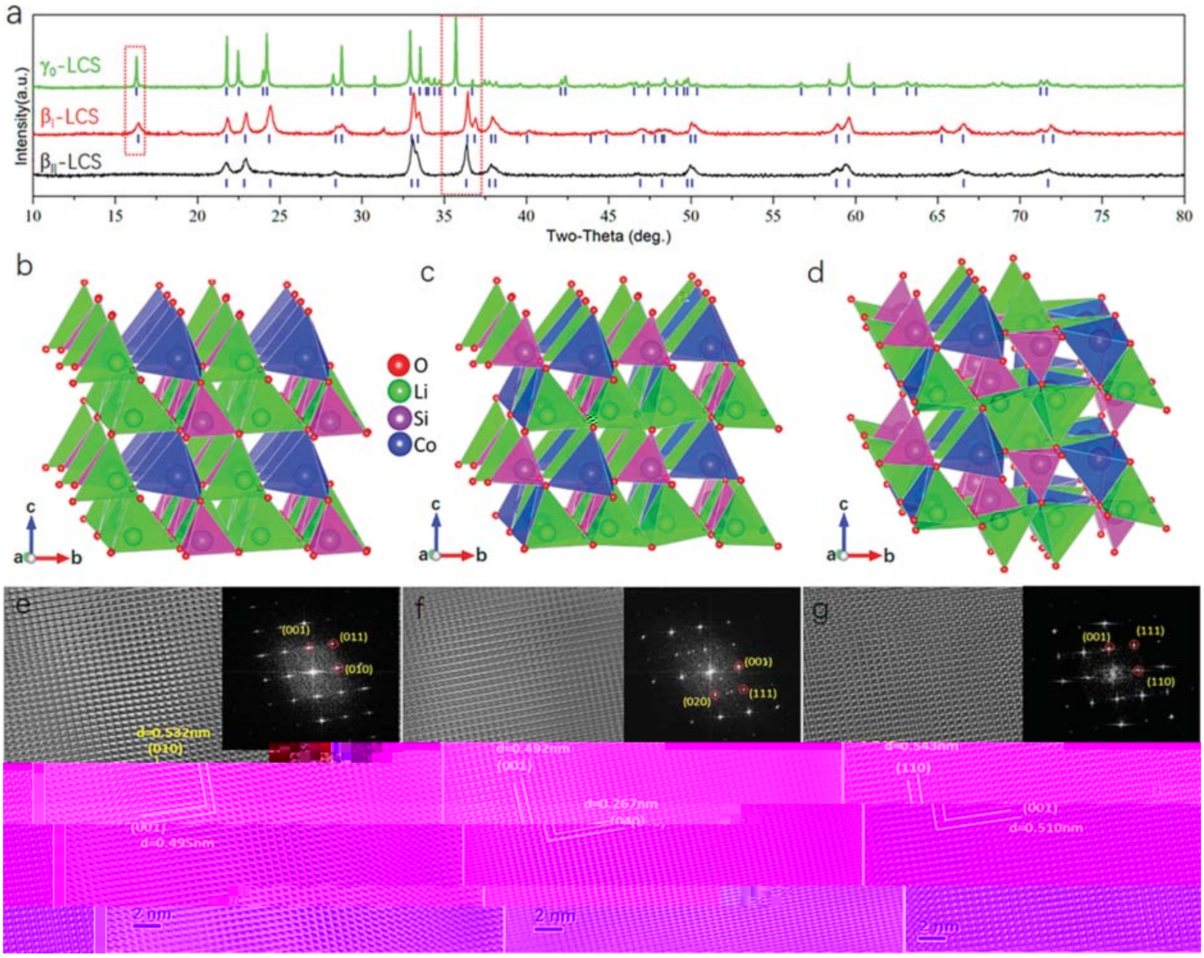

Figure 1. ... β_{II}-, β_I-, and γ_0-... 200 °C ... 700 °C ... 1100 °C ... 850 °C ... β_{II}- ... β_I- ... γ_0-... β_{II}, β_I, ... γ_0 ...

[illegible] [13] [illegible] [16] [illegible] Co_3O_4 [illegible] CoOOH [17,18] [illegible] CoO_2 [illegible] Co_2SiO_4 [illegible] [19] [illegible] Co_2O_7 [illegible] η = 0.42 [illegible] CoOOH = 0.48 [illegible]

O−H [illegible] [20] [illegible] O···H−O [illegible] [21] [illegible] β_{II}, β_I, γ_0 [illegible] β_{II}-LCS [illegible] IO_2 [illegible]

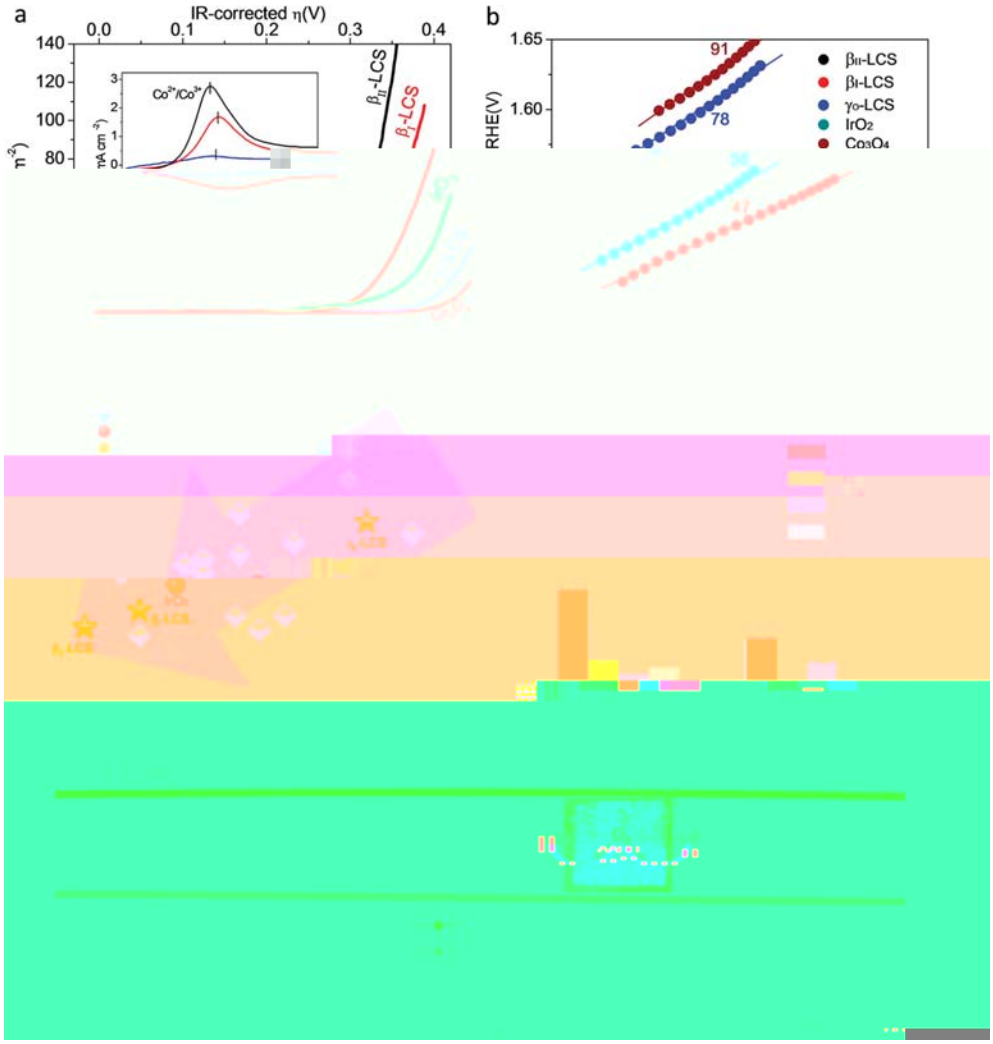

Figure 2. [illegible] 1600 [illegible] β_{II}- β_I- γ_0- C [illegible] IrO_2 Co_3O_4 [illegible] 1 M KOH [illegible] : 10 $^{-1}$ [illegible] η 10 A $^{-2}$ [illegible] C - [illegible] A [illegible] F [illegible] C [illegible] J–t [illegible] C β_{II}- C β_I- C IrO_2 [illegible] fi [illegible] 1 [illegible] η 0 32 [illegible] 10 A $^{-2}$ IrO_2

[illegible] C [illegible] O [illegible] fi [illegible] 2 4 [illegible] β_{II}- C [illegible] fl C O_4 [illegible] 0 3 [illegible] fi ff [illegible] ffi [illegible] OE [illegible]

RESULTS AND DISCUSSION

[illegible] O_4 E C [illegible] 22 23 I [illegible] O_4 [illegible] fl [illegible] O_4 L ff [illegible] O_2 [illegible]

O_4 [illegible] I [illegible] 24 [illegible] ff [illegible] OE [illegible] C [illegible] OE [illegible] C [illegible] I [illegible] F [illegible] ff [illegible] F [illegible] C [illegible] 200 °C [illegible] β_{II} [illegible] C [illegible] 2$_1$ 23 [illegible] β_{II}- C [illegible] 700 °C fl [illegible] 2θ 16 4° [illegible] 011 [illegible] β_I [illegible] C [illegible] 2$_1$ G 23 F [illegible] B 24 [illegible] γ_0- C [illegible] 2$_1$ G [illegible] β_I- C [illegible] 1100 °C [illegible]

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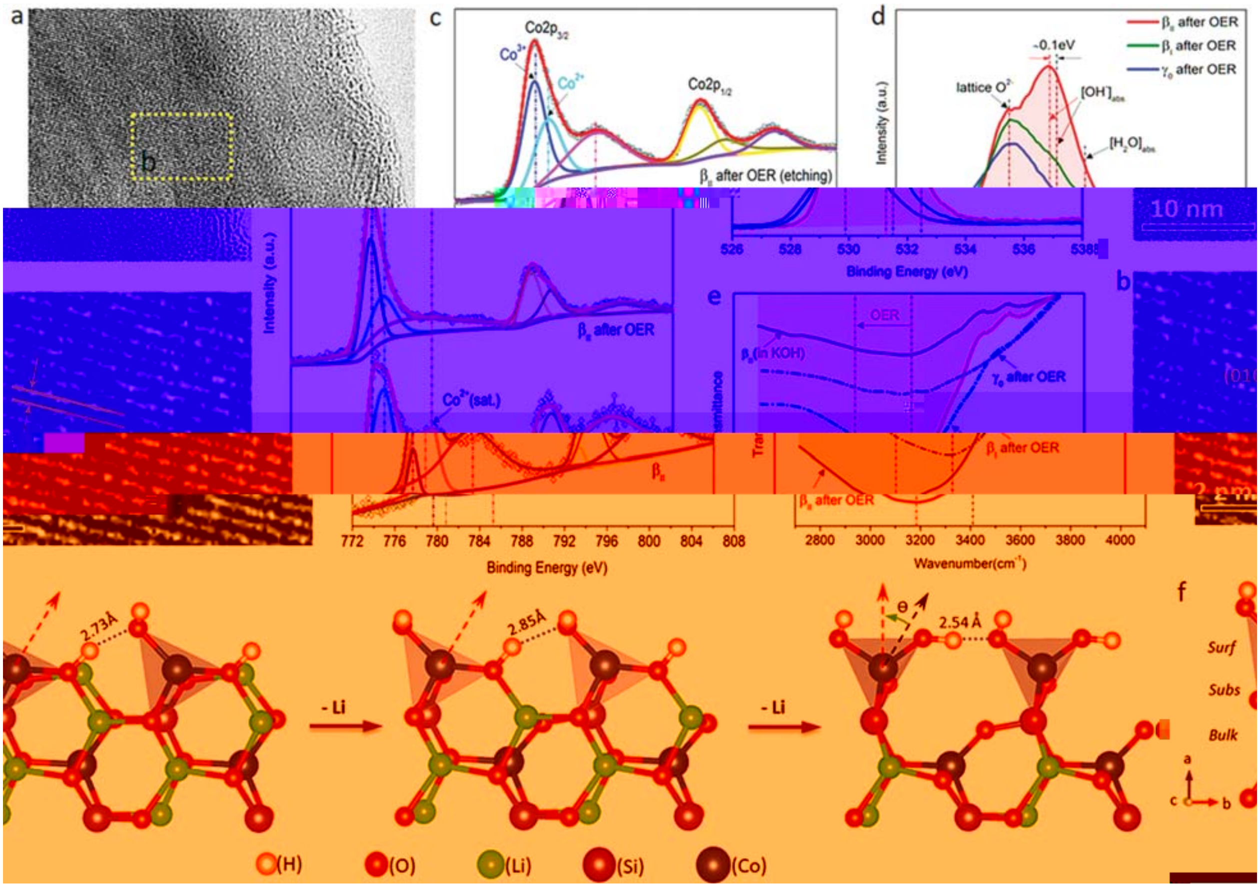

Figure 3. H E t tt β_{II}- C t t OE 1 C 2 t β_{II}- β_{I}- γ_0- C t OE 1 O 1 : ≈ 32 H_2O C t t H_2O ≈ 29 6 tt O^{2-} t β_{II}- C ≈ 31 OH C t t OH^- A -F t t H−O t t t t 100 β_{II}- C t t t t t HB t t t t β_{II}- C t

8 0 °C t t 100 t t fl t t 2θ 3 7° t t 002 F 1 t t fi t t ff t t t C t tt t t t t t t t tt t t t fi t 1−3 t t t β_{II}- β_{I}- γ_0-C t t tt t F 1− t I β_{II} C O_4 O_4 O_4 t t t t t t C O_4 t t t t a- t t t β_{II} t β_{I} C O_4 t t t t t I γ_0 t t t t t t t t t t t t t β_{II}- β_{I}- γ_0- C t E t E It F 2 t t t t β_{II}- C t 100 0 t t t 700 °C t t β_{I}- C t t t t t 1100 °C t γ_0- C t t

fl t t fi F 3 H t t t H E F 1− t t t t 100 t t O t t 2 t β_{II}- β_{I}- γ_0- C t t t t ff t t t t t 100 t t t t F 2 − t 2 1 2 t 100 H E t I t t t d t ⟨100⟩ H E F 1 − t ff t AED tt t F 1 − t fi t t t t t t t F 4 t t t t t t 2 t C 2 t t C O_4 t O_4 O_4 t t t t t C O_4 O_4 O_4 t t t t t t ff t ff t t t t t OE t t OE t t C t t O_2- t t 1 OH

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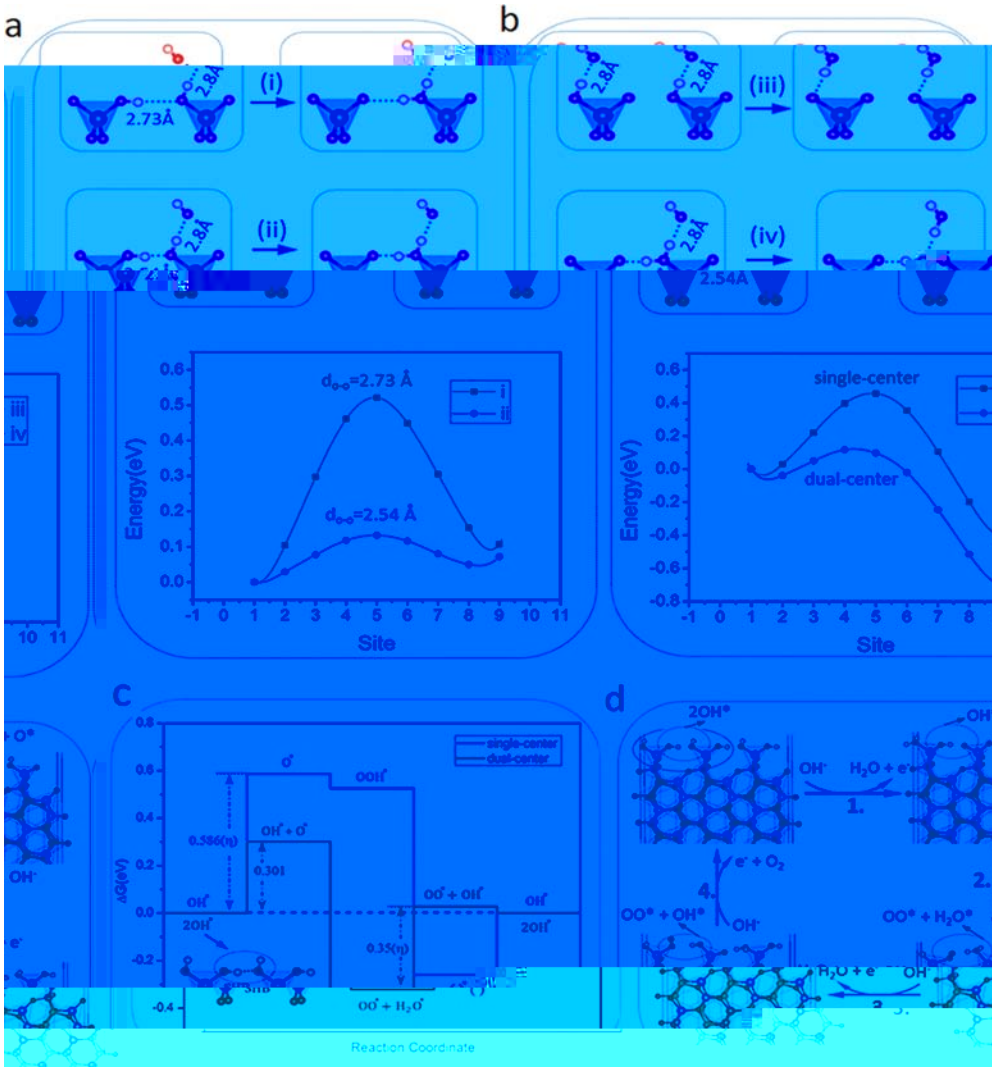

Figure 4. t t t t OH t 100 β_{II}- C t t t t t t t HB 2 4 t t t t t t OH* t OH⁻ t t t OE t t t t OH⁻ fi t t 28 t t t t HB t t HB 2 4 t t t t t HB F - t t t HB t 100 t t β_{II}- C

t H$_2$O OH⁻ t [33 34] I t t t OH⁻ β_{II}- C t OE t t t 0 1 t t O−H t OE F t t F t tt t t t fl t A t t t t O−H t t t t H−O t t t t 3400 cm^{-1} t t t t B OE t t - C t t t t O−H t t t 3400 cm^{-1} t F 9 t t t O−H t t β_{II}- C t t t t OH t [3] A t OE t t t OH⁻ t t t C t t t t t F t t β_{II} t t t 3200 cm^{-1} F 3 It t t t t t H t HB t t H t [36] t t t t F t OE t t t HB t t OH⁻ t t O t t t t OH t t t t t t t t t t F 10 I t t t t t t OH⁻ t t t C t t t t t 100 β_{II}- C F 3 t t t t t t t t t t t t 100 β_{II}- C t OH t t 100 β_{II}- C t t t t t F 11 t t t t t t t t F 3 t t t t t t t t t t t t t H 0−14 A t t [22] t t t t - t t t t F C t t t t t t t t t t t t t t t t t t

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CONCLUSION

ASSOCIATED CONTENT

S. ppor ing Informa ion

AUTHOR INFORMATION

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ORCID

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