

Supporting Information

Cobalt Oxide Nanoparticles on TiO₂ Nanorod/FTO as a Photoanode with Enhanced Visible Light Sensitization

Vivek Ramakrishnan,^a Kim Hyun,^a Jucheol Park,^b and Beelyong Yang^{*a}

a) School of Advanced Materials and System Engineering, Kumoh National Institute of Technology, Gumi-si, Gyeongsangbuk-do, Republic of Korea.

b) Electronics & Information Technology Research Institute Gumi, 17 Chomdangjeop 1 St. Sandong, Gumi, Gyeongbuk, Republic of Korea.

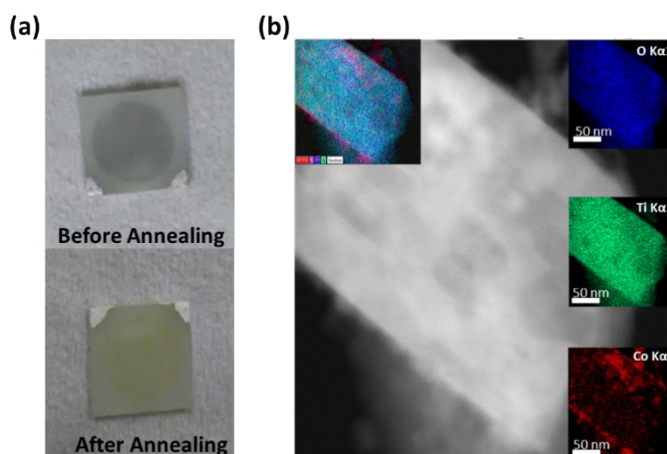


Figure SI 1. (a) Images of electrodeposited Cobalt oxide on hydrothermally grown TiO₂/FTO by before and after annealing (b) EDS mapping of Cobalt oxide nanoparticle on TiO₂ nanorod/FTO

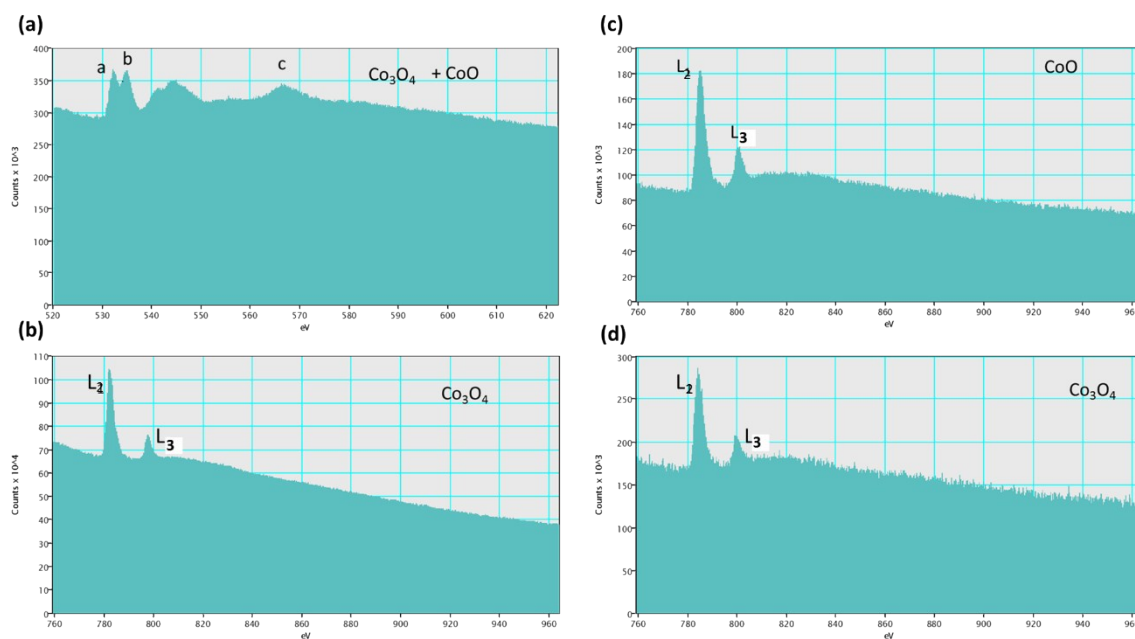


Figure SI 2. EELS spectrum of Cobalt oxide nanoparticle on TiO₂ nanorod/FTO annealed in air at (a), (b), (c) 500°C (d) 600°C

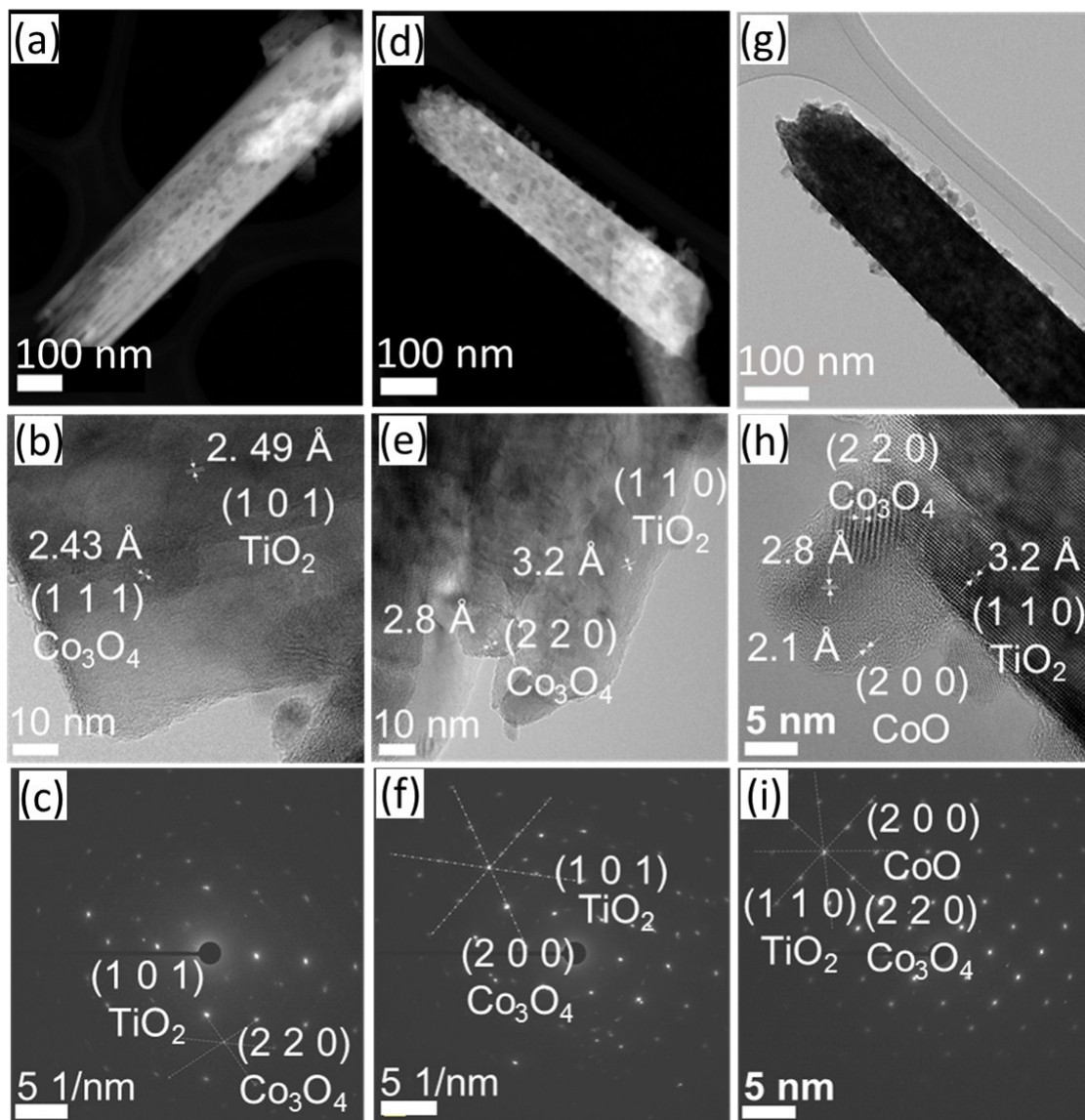


Figure SI 3. TEM image, Lattice-fringe, and SAED pattern of Cobalt oxides nanoparticles on TiO₂ nanorod with (a), (b), and (c) 20 seconds, (d), (e), and (f) 40 seconds and (g), (h), and (i) 60 seconds of electrodeposition time and annealing at 500°C in air.

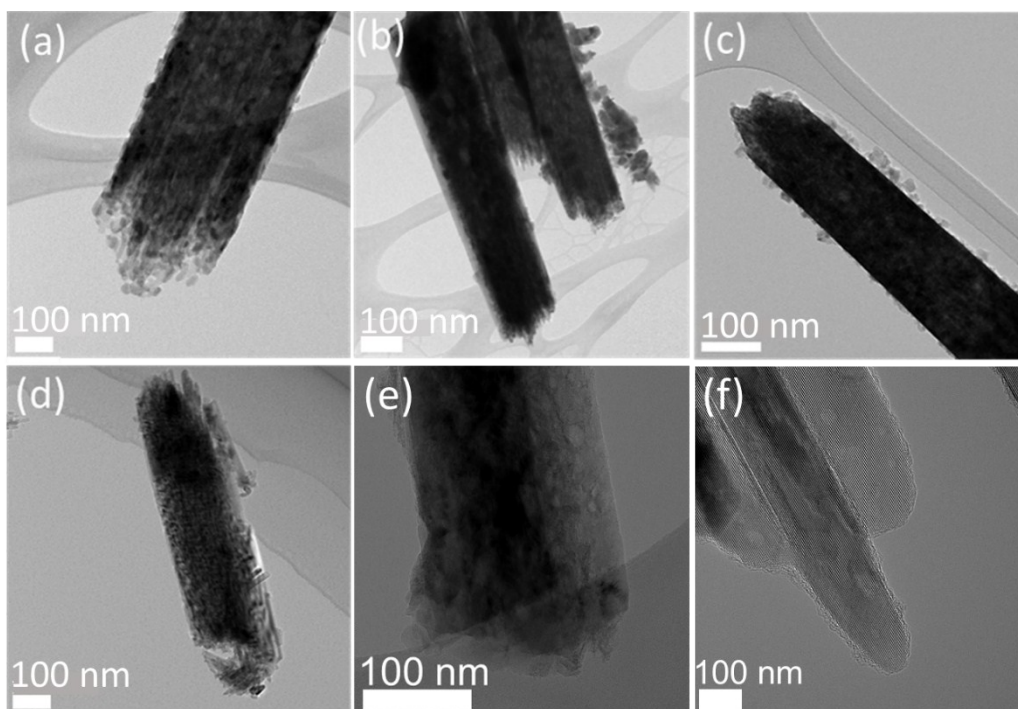


Figure SI 4. (a),(b), (c), (d), (e), and (f) TEM images of Cobalt oxides nanoparticles on TiO_2 nanorod with annealing temperature of 700°C , 600°C , 500°C , 400°C , 375°C and 350°C respectively in air.

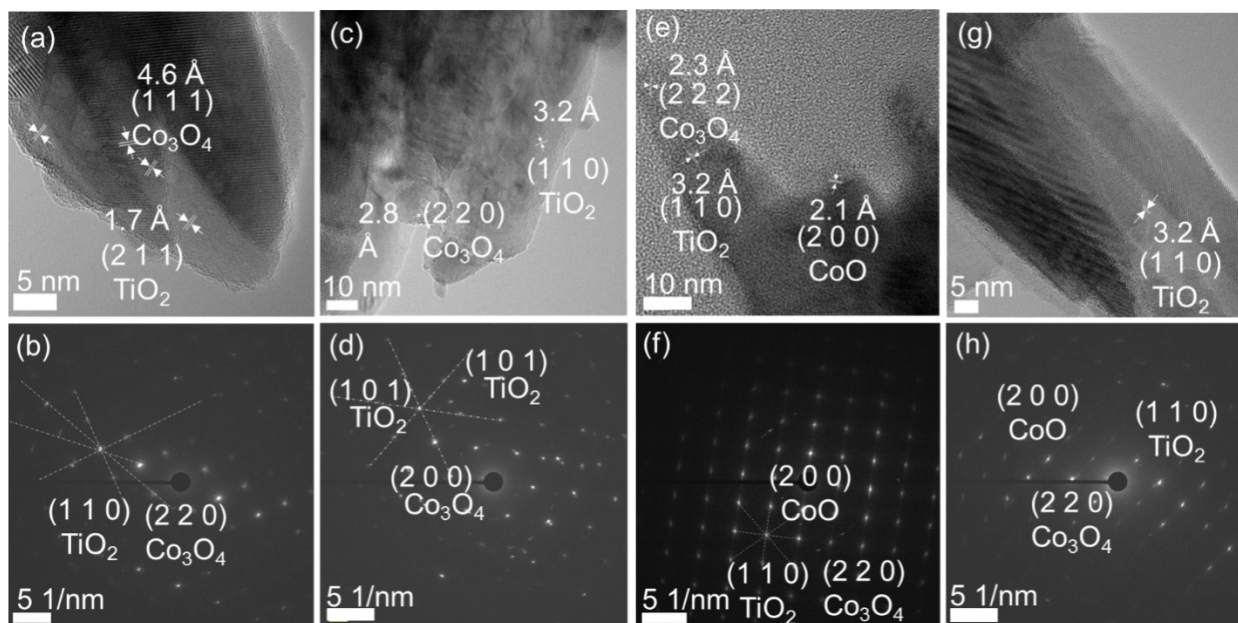


Figure SI 5. Lattice fringe TEM images and SAED patterns of Cobalt oxides nanoparticles on TiO_2 nanorod with annealing temperature of 600°C , 500°C , 400°C and 375°C respectively in air.

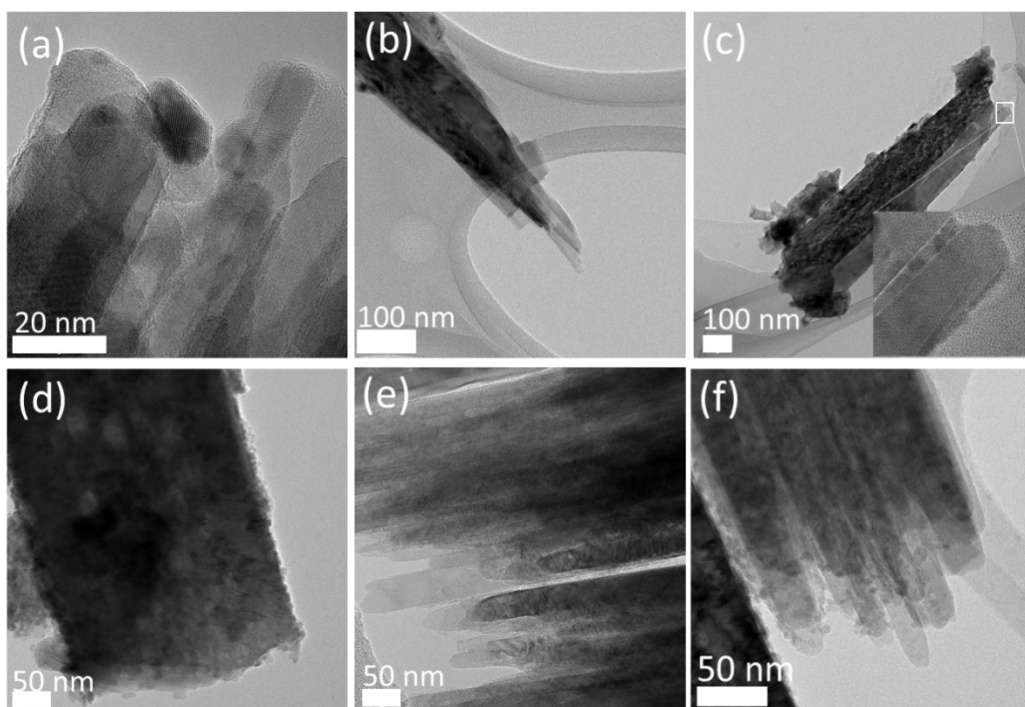


Figure SI 6. TEM images of Cobalt oxides nanoparticles on TiO₂ nanorod with annealing temperature of 700°C, 600°C, 500°C, 400°C, 375°C, and 350°C respectively in N₂.

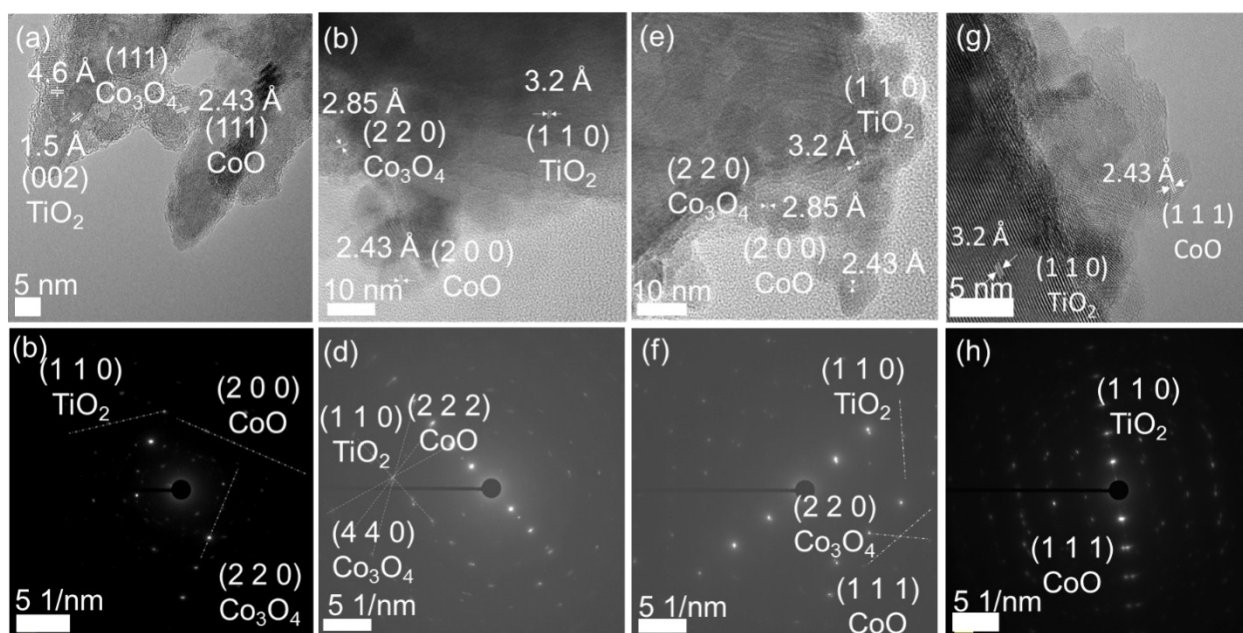


Figure SI 7. Lattice fringe TEM images and SAED pattern of Cobalt oxides nanoparticles on TiO₂ nanorod with annealing temperature of 600°C, 500°C, 400°C and 375°C respectively in N₂.

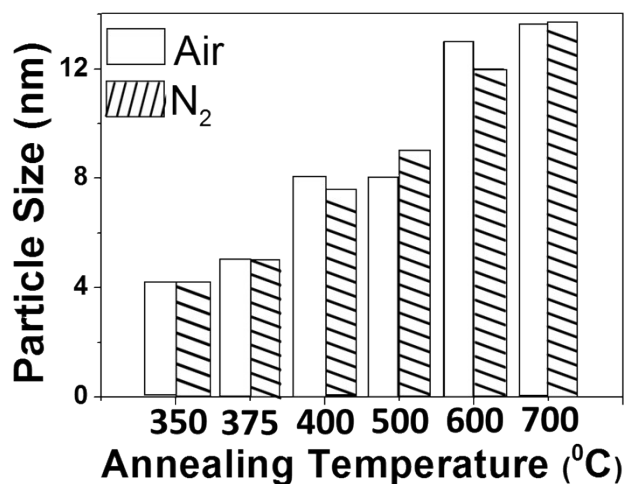


Figure SI 8. Relation between particle size with respect to electrodeposition time of Cobalt and its oxide formed on TiO₂ nanorods.

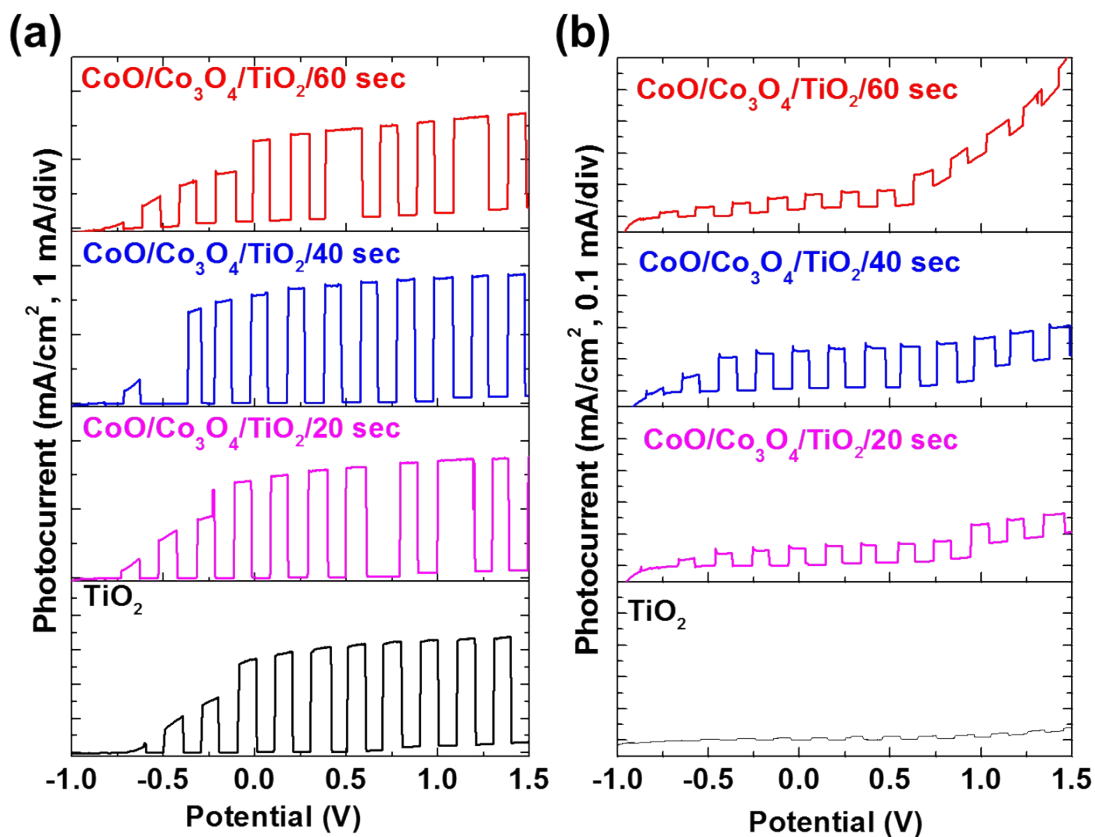


Figure SI 9. Comparison of photocurrent density-voltage diagram of Cobalt oxide/TiO₂ nano-structure and TiO₂ nanorod on FTO in 0.1 M Na₂S aqueous solution with light intensity 100 mW/cm² annealed in air with various electrodeposition time of 20, 40, and 60 seconds (a) white light (b) visible light.

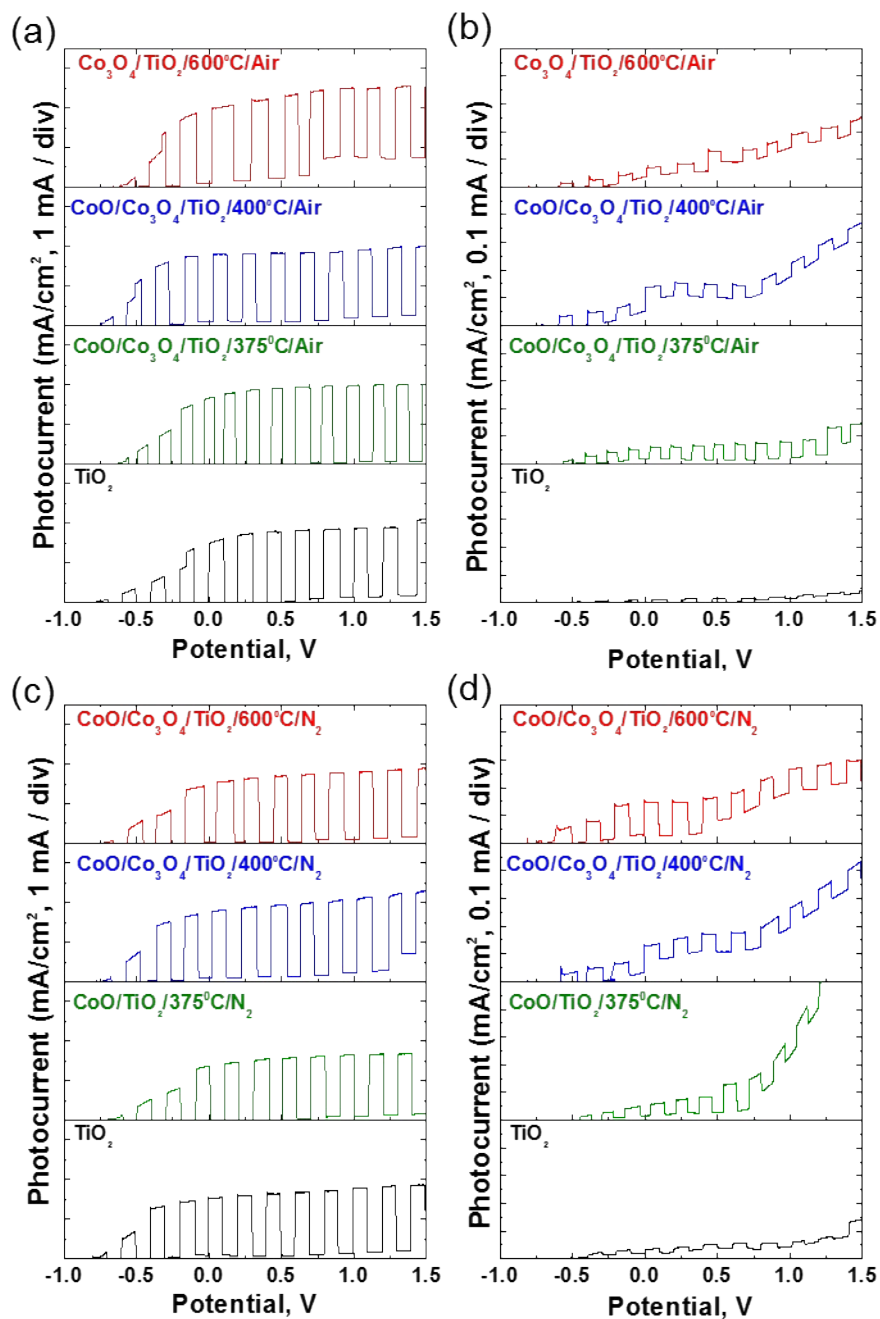


Figure SI 10. Comparison of photocurrent density-voltage diagram of Cobalt oxide/TiO₂ nanostructure and TiO₂ nanorod on FTO in 0.1 M Na₂S aqueous solution with light intensity 100 mW/cm² annealed in air and nitrogen at 600°C, 400°C, and 350°C.

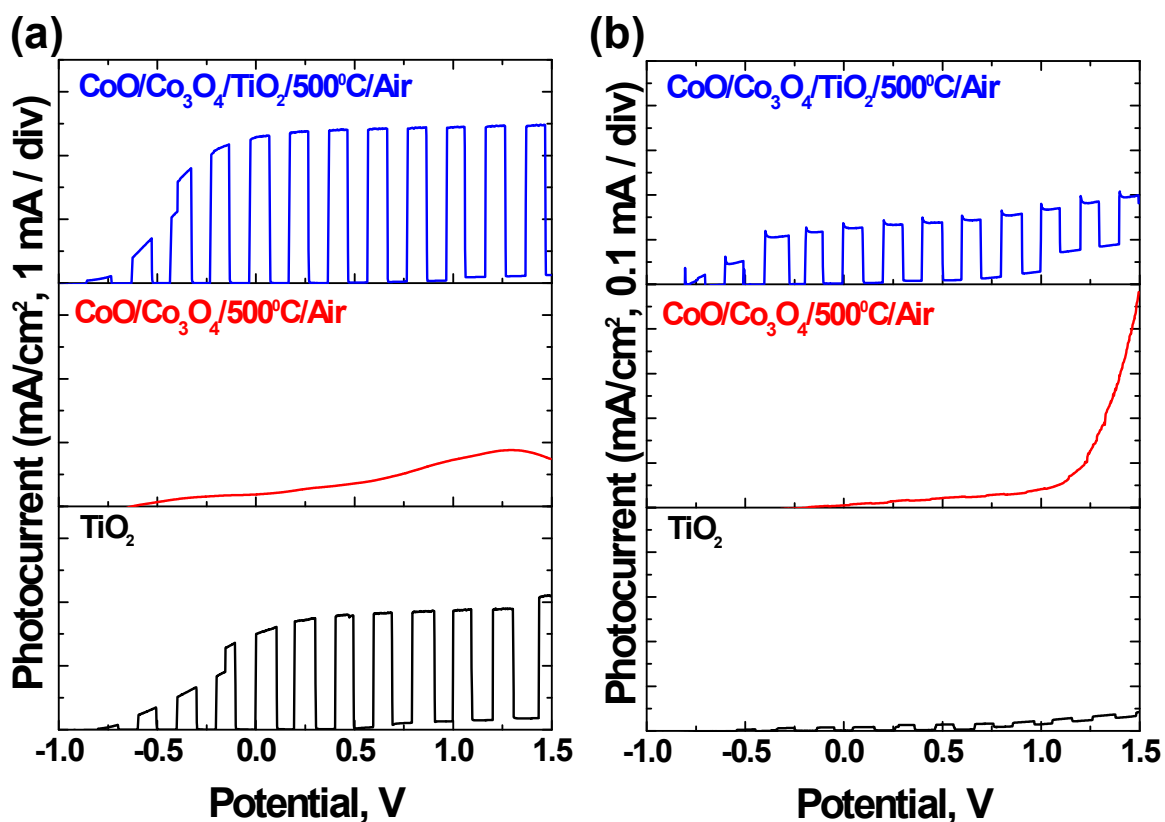


Figure SI 11. Comparison of photocurrent density-voltage diagram of Cobalt oxide/TiO₂ nanostructure to that of bare Cobalt oxide and TiO₂ nanorod on FTO in 0.1 M Na₂S aqueous solution with light intensity 100 mW/cm² annealed in air at 500°C (a) white light (b) visible light.

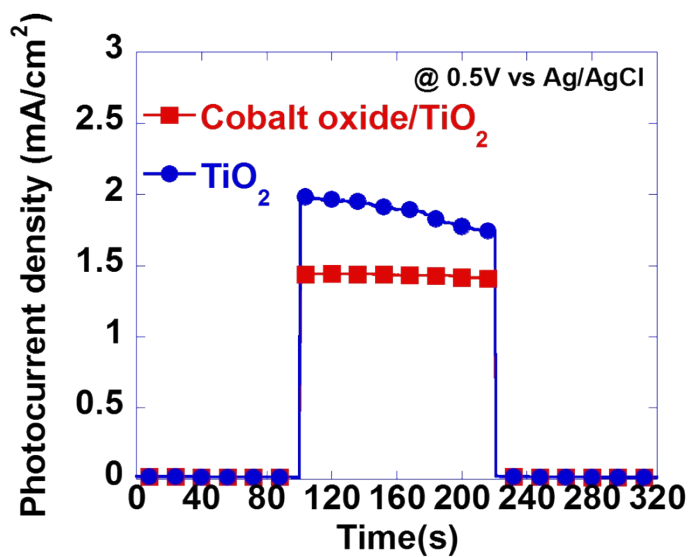


Figure SI 12. Photocurrent density kinetics of Cobalt oxide/TiO₂/FTO and TiO₂/FTO with biased ($V_B = 0.5$ V vs Ag/AgCl) electrodes in 0.1 M Na₂S (pH = 12.5) solution under white light irradiation (100 mW/cm²).