

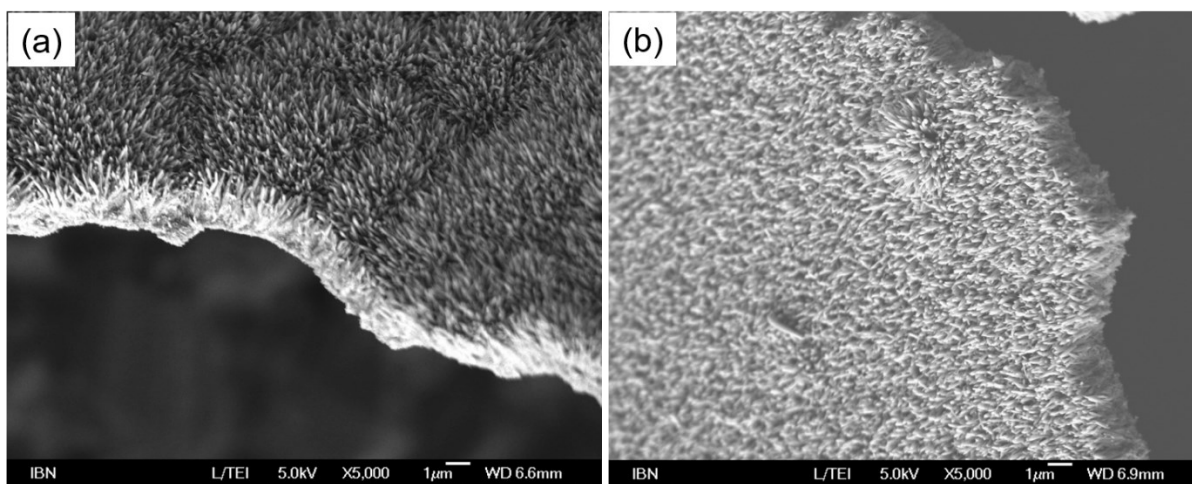
## Supporting Information

### Iron Based Nano-structured Surface with Antimicrobial Property

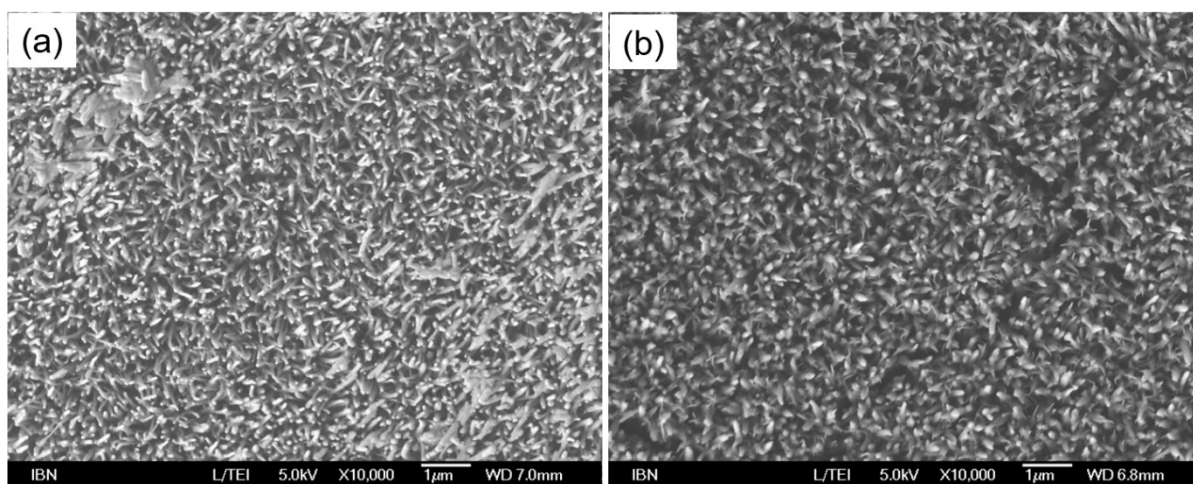
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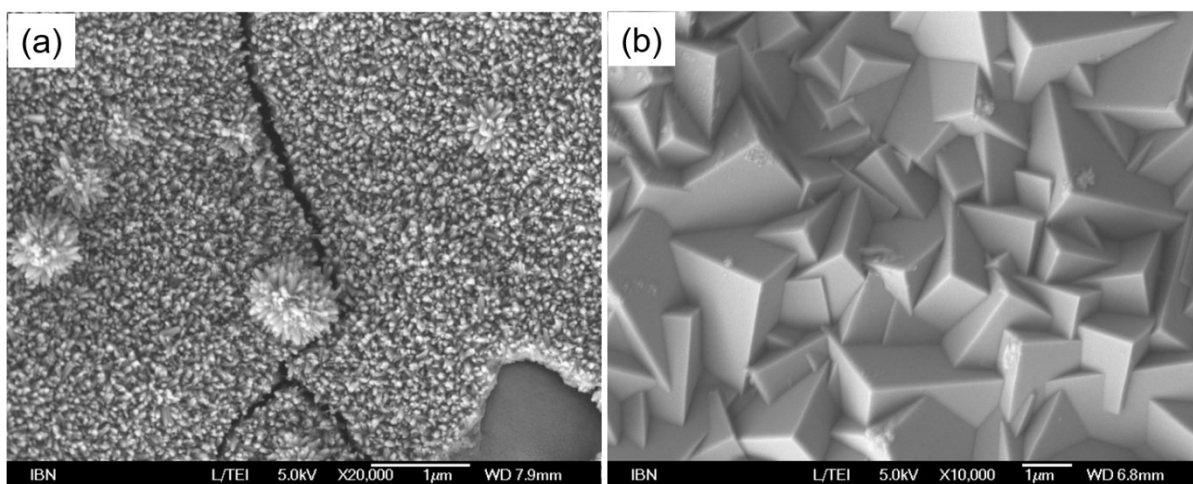
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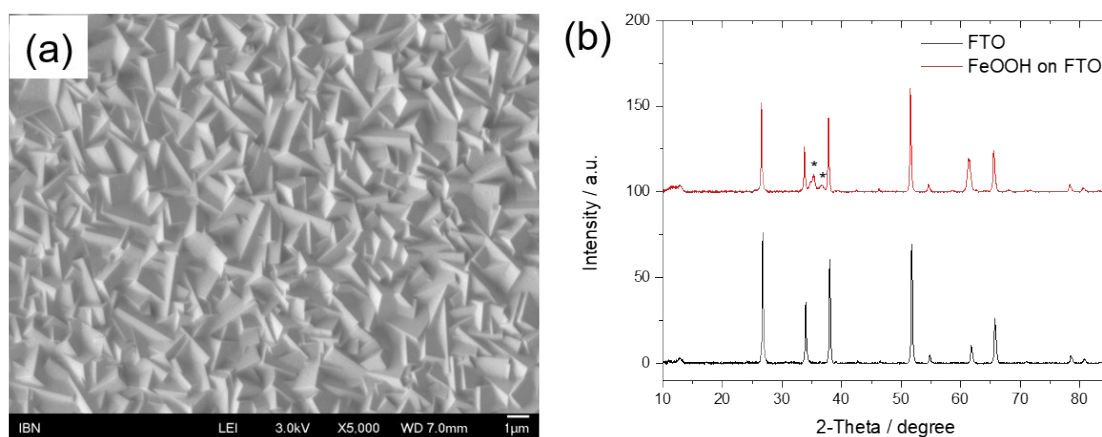
**Figure S1.** FeOOH nanopillars array film peeled off from (a) glass slides, and (b) Teflon surface. Bar = 1 μm



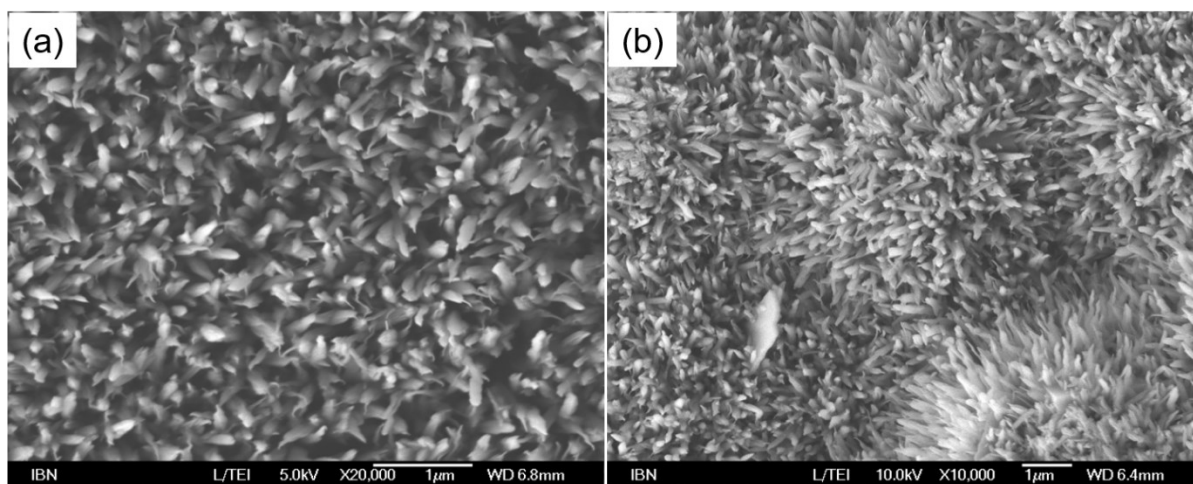
**Figure S2.** Reaction time on the thickness of FeOOH nanopillars. Growing conditions: hydrothermal reaction, 100 °C for (a) 6 h and (b) 12h.



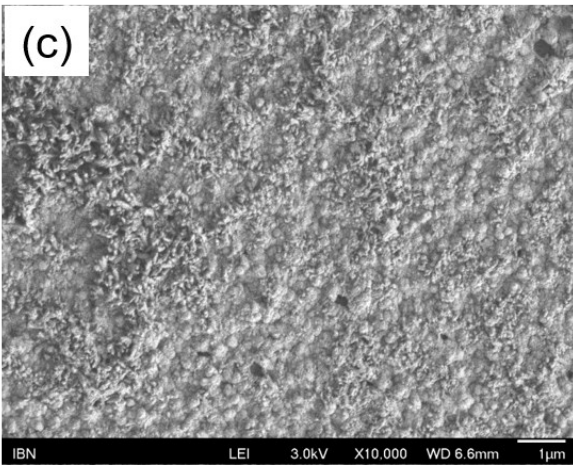
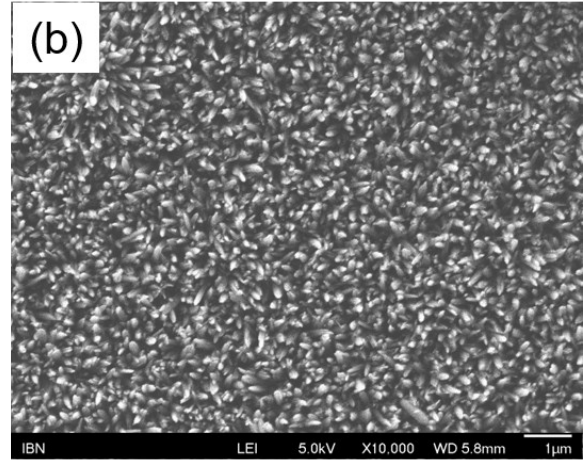
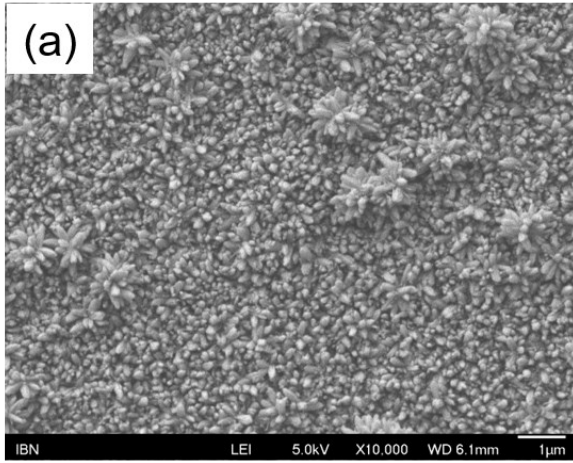
**Figure S3.** (a) 1/3 loading amount of reactants, hydrothermal reaction at 100 °C for 12h. With 1/3 loading of reactants, short length pillars (0.3 μm) were obtained. (b) Double concentration of reactants with glass slides, hydrothermal reaction, 100 °C for 12 h. FeOOH pyramids were obtained on glass surface.



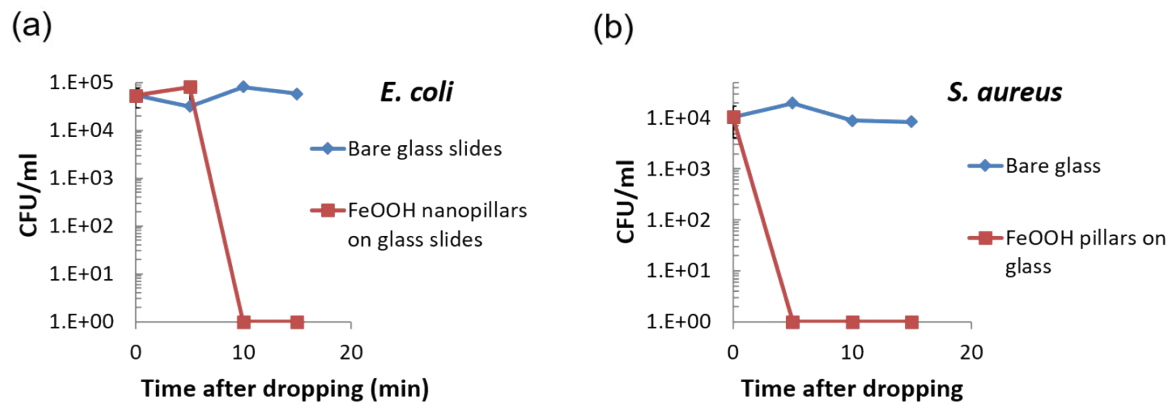
**Figure S4.** (a) FeOOH pyramids grow on FTO glass, and (b) XRD pattern of FeOOH on FTO glass. Growing conditions:  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  (1.89 g),  $\text{Na}_2\text{SO}_4$  (0.96 g),  $\text{H}_2\text{O}$  (70 ml), FTO glass slides facing down in hydrothermal reactor, 100 °C for 24 h.



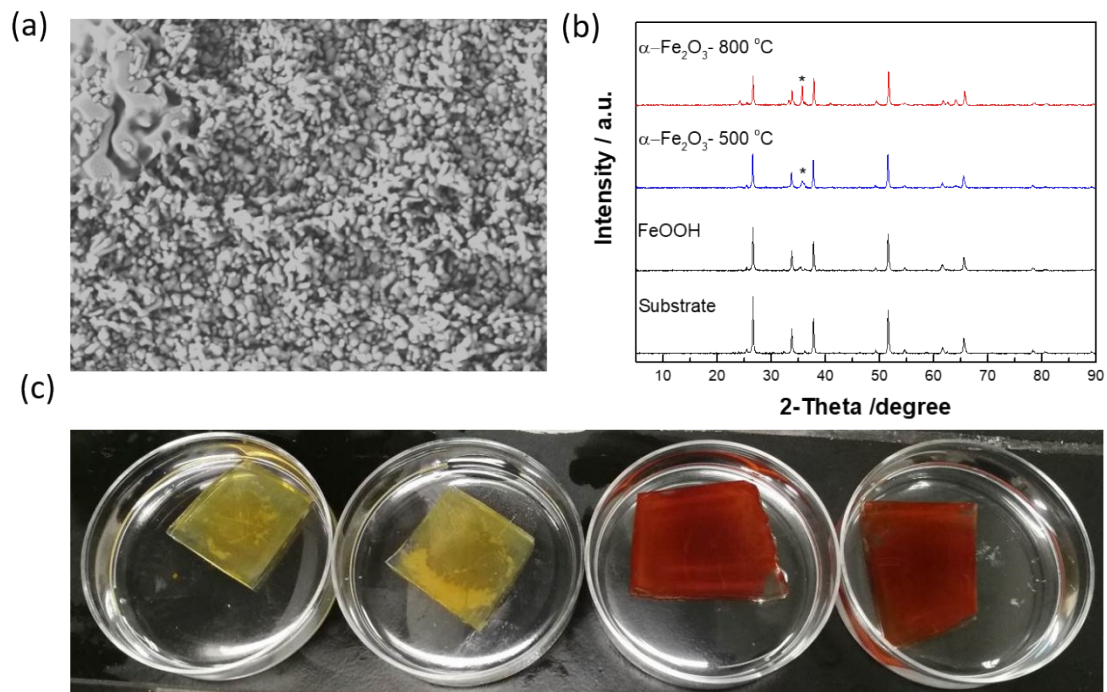
**Figure S5.** FeOOH nanopillars surface by (a) one-step and (b) two-step reaction. Method: FeOOH nanopillars grow for the first time at 100 °C for 12 h. The surface was taken out placed into another fresh reaction solution at 100 °C for another 12 h.



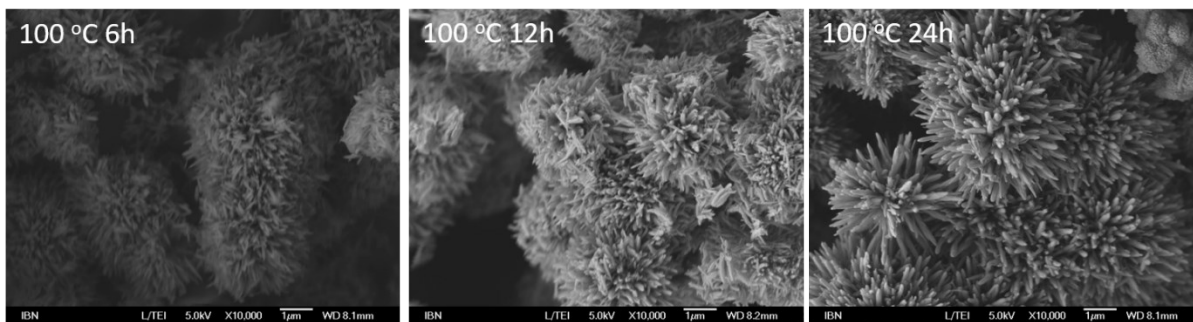
**Figure S6.** Growth of FeOOH nanopillars array on FTO glass. Hydrothermal reaction at (a) 100 °C for 24 h, (b) 120 °C for 24 h and (c) 150 °C for 24 h respectively.



**Figure S7.** Antibacterial property evaluated by droplet testing method for (a) *E. coli*, and (b) *S. aureus*. The data are expressed as mean  $\pm$  S.D. of triplicates.

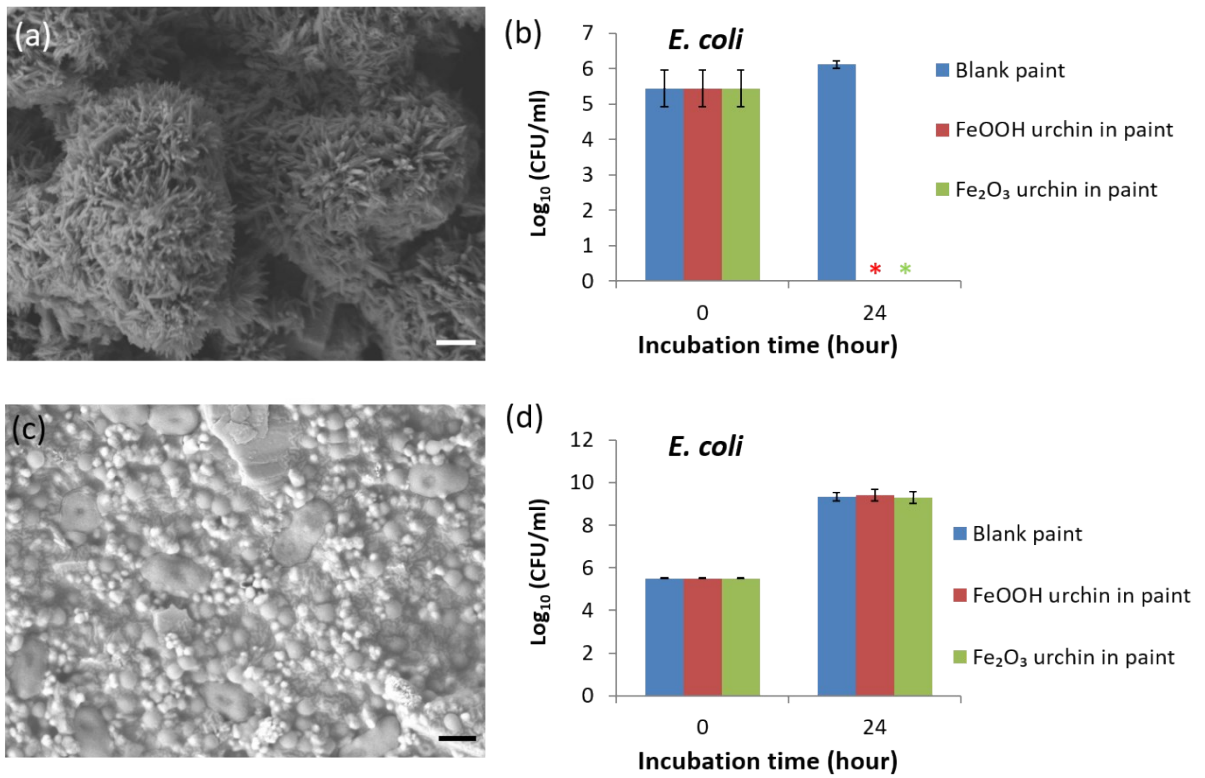


**Figure S8.** FeOOH nanopillars array surface after heat treatment. (a) heat treatment at 800 °C for 15 min, (b) XRD pattern of the surface after heat treatment at different temperatures, and (c) images of the surface before (yellowish color) and after heat treatment (dark red color).



**Figure S9.** Sea urchin-like FeOOH particles prepared at different conditions of: (a) 100 °C for 6 h, (b) 100 °C for 12 h, and (c) 100 °C for 24 h.





**Figure S10.** (a) Coating of FeOOH urchin particles on glass slide with diluted paint as binder, and (b) JIS Z 2801 testing results. (c) Coating of FeOOH urchin particles on glass slide with non-diluted paint as binder, and (d) JIS Z 2801 testing results. Bar = 1  $\mu\text{m}$ .