Supporting information

Low Temperature Electrolysis for Iron Production

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Figure S 1. The two-electrode electrolytic cell for Fe$_2$O$_3$ electrolysis.
**Figure S 2.** The background current with of three kinds of current collector. Ti plate, Ni plate and stainless steel plate were immersed into NaOH solution separately, and 1.7 V of voltage was applied between the tested material and the Pt foil counter electrode.

![Graph showing the relationship between voltage and current density](image)

**Fitting equation:**

\[ Y = 3.212 \times \exp(x/0.078) + 0.018 \]

**Figure S 3.** The polarized current density with different voltages setting up in the two-electrodes cell for electrolyzing Fe$_2$O$_3$. The current density was recorded when electrolyzing carried on for half an hour.