Supplementary Information

1. Synthesis Procedures of Fe Doped TiO_2 and PANI Used in the Experiment:

1.1 Synthesis of Fe Doped TiO_2

Fe-doped TiO_2 nanoparticles were synthesized via a simple co-precipitation method [1] similarly described by Patle *et al.* 1 M TTIP into distilled water was prepared with continuous stirring for half an hour (solution 'A'). 0.05 M ferric nitrate in distilled water with continuous stirring for half an hour (solution B). Subsequently, solution B was mixed with solution A, and the solution mixture was vigorously stirred for 2 hours. The precipitate was then filtered and washed with water several times. Thus, obtained white precipitate was mixed with 20 ml H_2O_2 to get a transparent orange solution. The solution was diluted with 10 mL of distilled water until the color changed from orange to yellow. The solution was kept for 2 days for aging. Further, the solution was filtered and washed with distilled water, dried at 100°C in the oven, and calcined at 500°C for 6 hours.

1.2 Preparation of PANI

In a typical procedure, 1.82 mL of aniline [2] monomer was dissolved in a 100 mL reaction solution of 0.4 M acetic acid and 1 M methanol in 200 mL distilled water. 5.71 g ammonium persulphate was similarly dissolved to provide 100 mL solutions. The solutions of aniline and oxidant were cooled at 0-5°C for 30 mins and then mixed rapidly into a beaker and stirred vigorously for 30 sec. The mixture was left still to react for 10 hours at 0-5°C. The dark green precipitate was filtered, washed with distilled water, and dried at room temperature to obtain PANI.

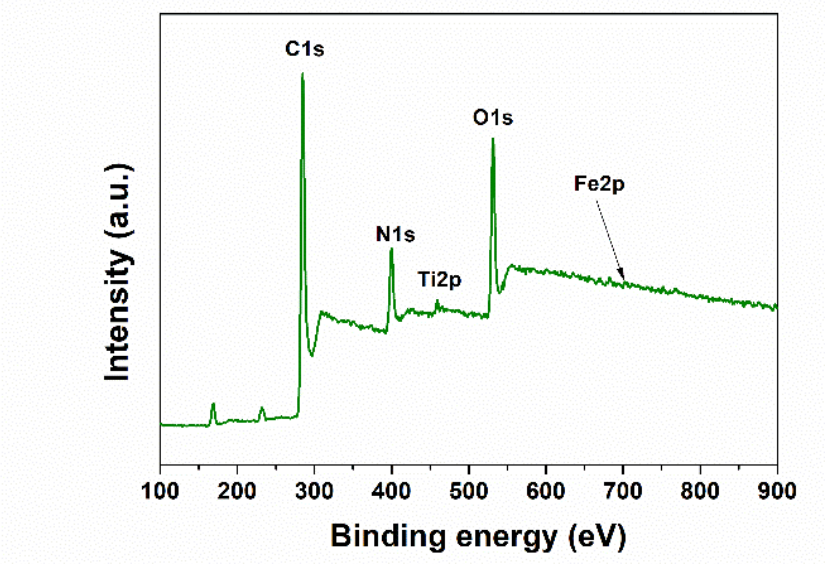

Figure S1 XPS survey spectra of Fe doped TiO_2@PANI.

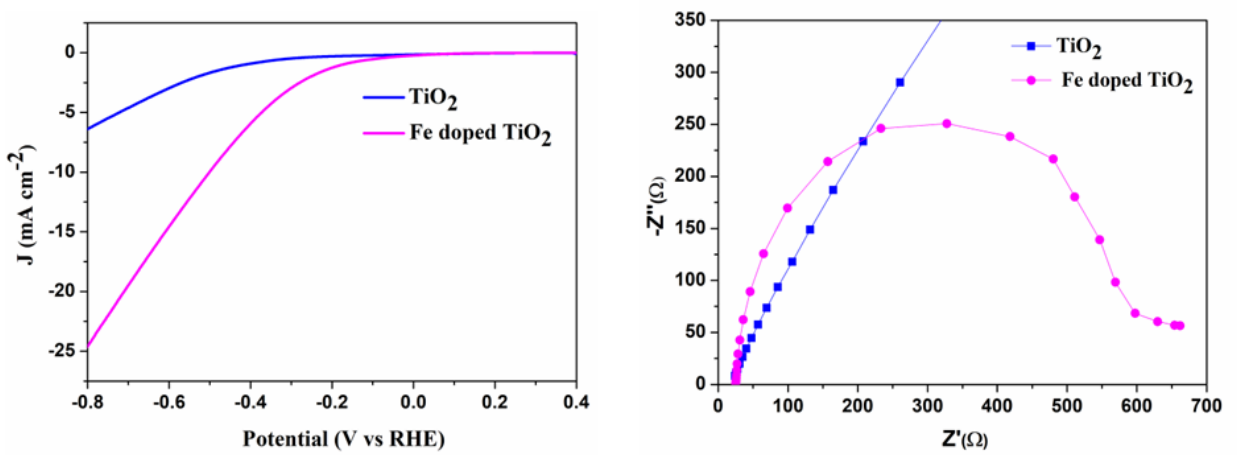

Figure S2 Comparison of electrocatalytic performance of TiO_2 and Fe doped TiO_2 (a) Polarization curves showing onset potentials for HER, (b) Nyquist impedance.

References

1. Patle LB, Labhane PK, Huse VR, Gaikwad KD, Chaudhari AL. Synthesis and structural analysis of Fe doped TiO_2 nanoparticles using Williamson Hall and Scherer Model. Proceedings of the 2nd International Conference on Condensed Matter and Applied Physics (ICC 2017); 2018 May 8; Bikaner, RAJ, India. Melville: AIP Publishing LLC.
2. Huang Z, Liu E, Shen H, Xiang X, Tian Y, Xiao C, et al. Preparation of polyaniline nanotubes by a template-free self-assembly method. Mater Lett. 2011; 65: 2015-2018.