

Supporting Information

**La³⁺ doped TiO₂ nanoparticles decorated functionalized-
MWCNTs catalyst: a novel electrochemical non-enzymatic
sensing of paraoxon-ethyl**

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Result and discussion:

UV-DRS:

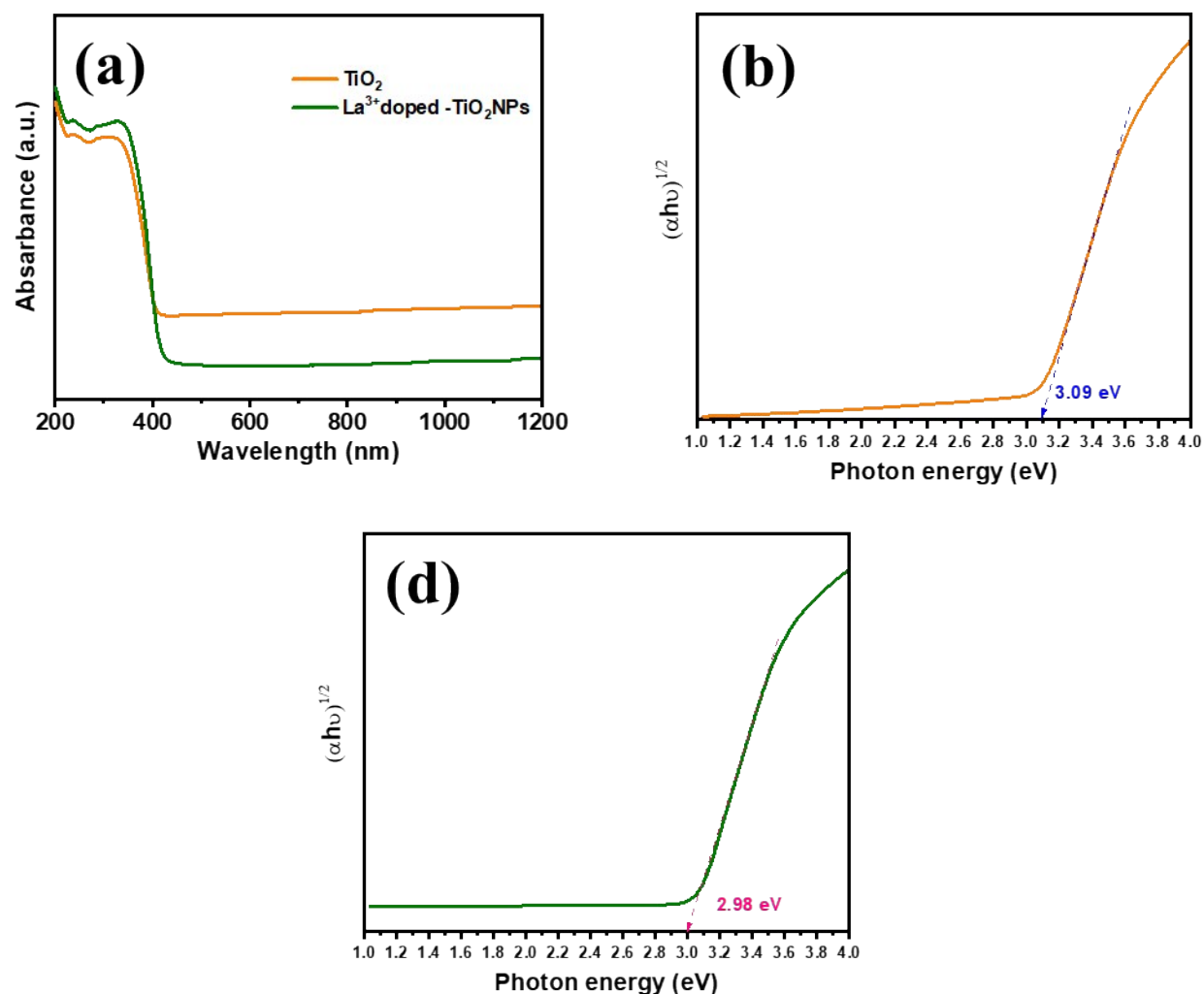


Fig.S1. UV-Vis diffuse reflectance spectra for the undoped and La³⁺-doped TiO₂ NPs.

The UV-Vis diffuse reflectance spectra of undoped and La³⁺ doped TiO₂ NPs and their bandgap energy (E_g) level, as given in Fig.S1(a-c), which were associated with an indirect transition. It can observe that the La³⁺ doping concentration shows the red-shift compared with undoped TiO₂ NPs, indicating that decreasing in the band gap (2.98 eV), while the E_g of pure TiO₂ was 3.09 eV. The red-shift could attribute to the charge-transfer transition between 4f or 5d electrons of La³⁺ doping on Ti⁴⁺ of TiO₂ NPs. Herein, the doping of La³⁺ reduced the bandgap while

compared with pure TiO₂, and eventually increases the catalytic ability to the La³⁺ doped TiO₂ NPs.

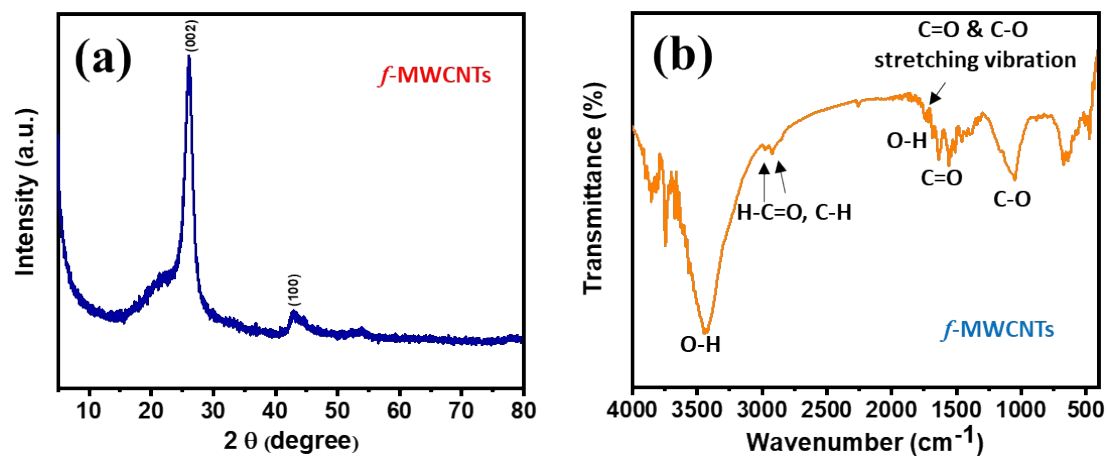


Fig.S2. (a) X-ray powder diffraction pattern and (b) FT-IR spectra of *f*-MWCNTs.

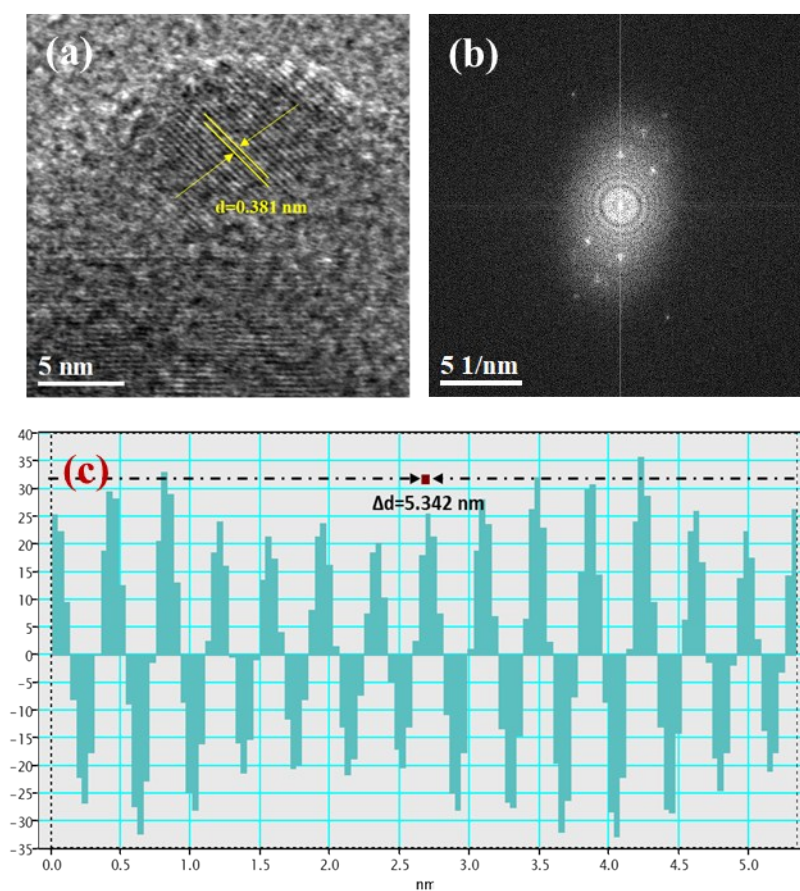


Fig.S3. (a-b) HR-TEM and SAED pattern image of pure-TiO₂ NPs. (c) The TiO₂ NP line profile for the selected line and its inverse FFT image, indicating that its d spacing was 3.81 Å.

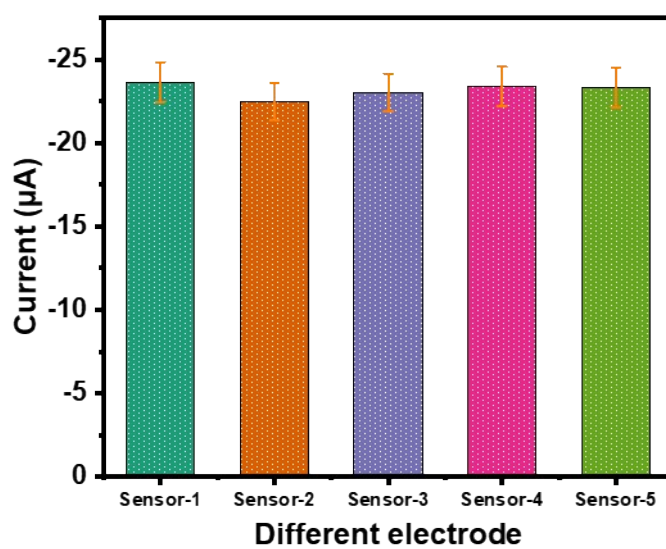


Fig. S4. The reproducibility of different modified electrodes using La³⁺ doped TiO₂ NPs decorated *f*-MWCNTs.