

Supporting Information

Non-thermal Plasma Integrated with Catalysts for Nitrogen Fixation from Nitrogen and Water

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1.Determination of NH_3

The concentration of NH_4^+ was determined by UV-vis spectrophotometric method. In our work, Nessler's reagent was employed to react with ammonia and generate a reddish-brown complex, appearing a strong absorbance peak at $\lambda=420 \text{ nm}$.^{1, 2} Typically, 0.5 mL of potassium tartrate solution ($\text{KNaC}_4\text{H}_6\text{O}_6$, 500 g/L) was added into 10 mL of the obtained absorbed solution. Then, 0.5 mL of Nessler's reagent was mixed thoroughly into the above solution. After 10 min, the solution was performed on a UV-vis spectrophotometer to get the absorbance intensity at 420 nm. A calibration curve was calculated using NH_4Cl as a standard solution to quantify the amount of NH_4 .

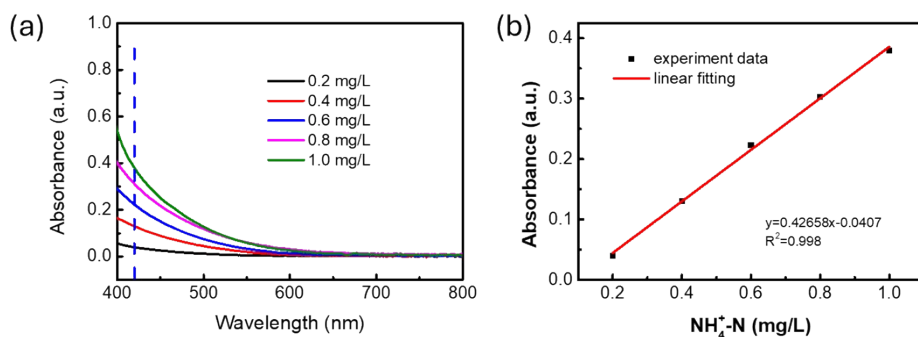


Figure S1 a) UV-vis absorption spectra of different concentration ammonia , (b) standard curve of ammonia

2.Determination of nitrate (NO_3^-) concentration

The concentration of NO_3^- was determined by UV-vis spectrophotometer. In a typical situation, 3 mL solution was measured by UV-vis spectrophotometer to obtain the absorbance intensity at $\lambda=220$ and 275 nm. The absorbance intensity is calculated by the formula $A = A_{220 \text{ nm}} - 2A_{275 \text{ nm}}$,

which is linearly related to the concentration of NO_3^- . A calibration curve was calculated using KNO_3 as a standard solution to quantify the amount of NO_3^- .³

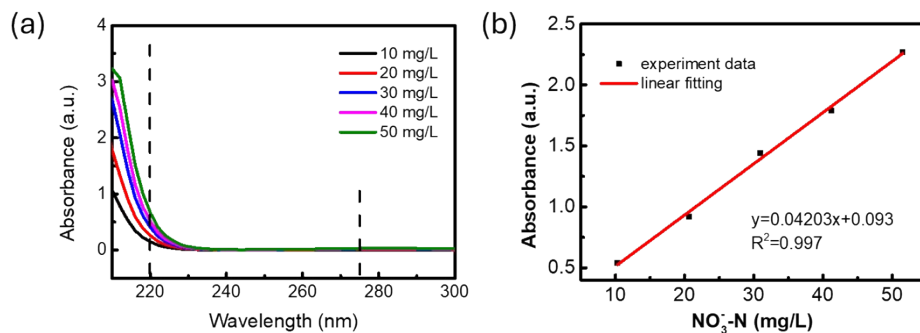


Figure S2. (a) UV-vis absorption spectra of different concentration nitrate (b) standard curve of nitrate

3.Determination of nitrite (NO_2^-) concentration

The concentration of nitrite (NO_2^-) was also measured by the UV-vis spectrophotometric method. In acid conditions, nitrite and sulphanilamide can generate a diazo compound. Then, the above solution can react with N-(1-naphthyl)-ethylenediamine-dihydrochloride (NEDA) to form a red azo dye.⁴⁻⁶ Generally, 0.5 mL of sample was mixed with 3 mL of color reagent (25 mL 85% H_3PO_4 , 2.5 g Sulfanilamide, 0.125g NEDA in 250 mL). Then, the above solution was incubated for 20 min at room temperature to measure by UV-vis spectrophotometer to obtain the absorbance intensity at $\lambda = 540$ nm.⁷

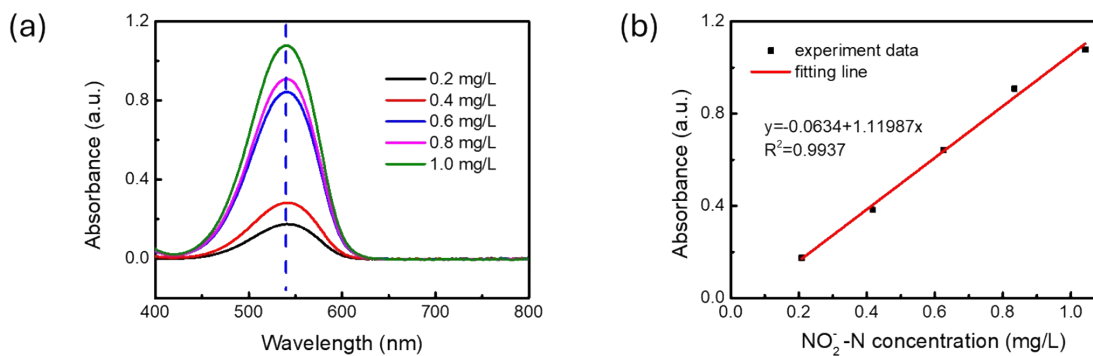


Figure S3(a) UV-vis absorption spectra of different concentration nitrite (b) standard curve of nitrite

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