Dear Sir,

Thank you for your work and comments on our paper. We have revised it according to the comments. The changes have been highlighted in the revision. Some of the questions were explained. Maybe the disciplinary background is different and it is difficult for us to understand some issues. We focus on the conjugated system of the material and the abundance of defects and improved properties.

Sincerely,

Xingfa Ma

I have carefully read the article and found it cannot be accepted for publication. Several points need corrections:

1) It is difficult to read the abstract without information about the allotropic varieties of Fe2O3 and of N3C4.

Thank you for your question. I don't understand the meaning of this question. The focus of the abstract is firstly to extend the spectral response of C_3N_4 and secondly to improve its photogenerated charge separation through heterojunction and passivation of interfacial defects to avoid the recombination of free electrons/holes. Since most of the literature on Fe2O3 and N3C4 is in the field of catalysis and photocatalysis, it is also interesting to the people from different disciplinary backgrounds doing some complementary research from a multidisciplinary perspective. Maybe the disciplinary background is different and it is difficult for us to understand this issue. We focus on the conjugated system of the material and the abundance of defects and improved properties. It is difficult to understand that it is difficult to read the abstract without information about the allotropic varieties of Fe2O3 and of N3C4. The abstract has been revised in the first revision. Maybe there's a big difference in emphasis.

2) In the introduction, line 119, is it necessary to introduce Au, Pd, Pt and Ag to speak about a Copper containing catalyst?

Thank you for your question. Since there is so much literature dealing with Au, Pd, Pt and Ag-containing nanocomposites, only a few brief remarks are given here. Expanding the spectral response, passivating defects, and improving the separation of photogenerated carriers mainly utilise their plasma effect and

high concentration of free electrons. Here we have added some references of Au, Pd, Pt and Ag-containing nanocomposites in the revision.

3) Preparation of graphitic carbon nitride and Fe2O3/C3N4 are clear. However the conductivity measurements are perform on the powder suspended on another organic conducting polymer. PET. Is not it possible to change of equipment and record the photoelectric signal of your powder directly? Using auto-supported wafers for instance??

Thank you for your question. The flexible substrates are mainly utilised for examination of optoelectronic signals in our studies, for example, PET, polyimide film, and paper. Optoelectronic signals are measured by generally introducing electrodes, such as Au gap electrode or FETs structure, etc. The Kelvin probes and the scanning tunnelling microscope probes can be used for photoelectric properties of nanoparticles and single nanowires, which the probes acted as electrodes. However, for the aggregated states of materials, it is difficult to characterise the photoelectric signals without introducing electrodes. The equipment and accessories for the characterisation of the photoelectric properties of nanoparticles and single nanowires were investigated about 15 years ago, but this research was not carried out due to lack of sufficient funding. Only the introduction of electrodes to characterise the optoelectronic properties of aggregated materials was carried out in our study. The preparation of materials inevitably brings about a number of defects that have a significant impact on performance. The control of defects can regulate the properties of materials. Our study focuses on the properties of materials.

4) Figures 2B and 2C cannot be accepted. A wrong signal is used for datacollection and appears as negative peaks. The differences between the signal of the sample without copper and with copper will be more precisely indicated by a Figure on which the two corresponding spectra are superposed.

Thank you for your question. They are not negative peaks. It is not a wrong signal for datacollection. This may be caused by some fluctuations in the suspension during the experiment, including changing light sources. This experiment examination focuses on the absorption edge. As the photoelectric signal examination shows that the material has absorption in the near infrared and measures a good photoelectric response signal. The Figure 2B, 2C just qualitatively characterise that there is some absorption edge in the NIR.

5) Line 243, as shown in Figure 2-A (not 4-A)

Thank you for your checking. We have revised it in the first revision.

6) Line 248, why don’t you use the Scherrer equation to estimate the size of Fe2O3 and N3C4 particles?

Thank you for your question. There are some errors in estimating dimensions using Scherrer equation. Using SEM and TEM are more intuitive. The sizes of nanomaterials were added using SEM and TEM in the revision. We can try to estimate the size of the material using the Scherrer equation. It is felt that the estimation error is large and we believe that the experimental characterization is more informative.

7) Scheme 2 relative to N3C4, to be replaced by something equivalent for Fe2O3 N3C4 mixed materials or remove it to keep the accent on Scheme 3

Thank you for your question. The Scheme 2 has been changed according to your comments.Since most of the literature on N3C4 based nanocomposites is in the field of catalysis and photocatalysis, it is also interesting to the people from different disciplinary backgrounds doing some complementary research from a multidisciplinary perspective. The Scheme 2 is just a research hotspot for this material. Highlighting research hotspots in materials does not prevent interdisciplinary people from studying common problems in the materials themselves.

8) Add a value corresponding to photocurrent response with your N3C4 initial component

Thank you for your question. Fig.3 has showed the photocurrent response for N3C4 component. The signal is weaker and less measurable.

9) In Figure 7, a blue curve is missing on Figure A on the second maximum for an excitation at 405 nm. Can it give to you information about the band-gap?

Thank you for your question. A blue curve is not missing on Figure A on the second maximum for an excitation at 405 nm. We did not measure the bandgap width. However, the photocurrent responses to 405,532, 650, 808, 980, and 1064 nm were determined. Good results were obtained. That means there's absorption from visible range to the near infrared. The expected bandgap width of the resulting nanocomposites is less than 1.16 eV.

9) Avoid Au, Pd, Pt and stays on Copper in line 369

Thank you for your question. A comparative experimental study was carried out using Au, Pt, Pd instead of Cu and similar results were obtained. Due to space limitations, the details are not presented here. Part representative photocurrent responses of Fe_2O_3/C_3N_4 modified with Au, Pd, Pt nanoparticles to 405, 532, 650, 780, 808, 980 of 50 mW, and 1064 nm of 40 mW light sources were added in the first revision. Some references of Au, Pd, Pt and Ag-containing nanocomposites were added in the revision.

10) XPS to allow a more complet discussion, I think that the XPS spectra of N3O4 and of Fe2O3 can be given at least as supplementary information for the reader?

Thank you for your question. The present study was carried out to passivate the defects using electronic effects. The XPS showed that the binding energy of some elements also changed at different chemical microenvironments based on the interaction of the electronic donor and acceptor. The presence of these different valence metal cations also produces multiple valence heterojunctions. This indicates that the resulting nanocomposites are an integration of multiple heterojunctions. Multiple heterojunctions would produce synergistic effects. It is recommended to keep the XPS results.

11) In the conclusion, it is announced that the copper nanoparticles are inserted inside the C4N4/Fe2O3 heterojunctions. Without MEB images and SEM analysis, it is difficult to believe you. You have the size of the metallic Copper nanoparticles and their aggregates in TEM. Is that size compatible with the dimensions expected between N3C4 and Fe2O3 heterojunctions?

Thank you for your question. It is difficult that the copper nanoparticles are inserted inside the C4N4/Fe2O3 heterojunctions using mixed method. It is not mean that the copper nanoparticles are inserted inside the C_3N_4/Fe_2O_3 heterojunctions. Secondly, C_3N_4/Fe_2O_3 heterojunctions adsorb copper sulphate solution, which is later reduced to copper. There is no size compatibility problem using in-situ synthesis. If Cu nanoparticles are mixed with C_3N_4/Fe_2O_3 nanocomposites, size compatibility issues arise. However, Cu nanoparticles are grown in situ at the surface or grain boundaries of the C_3N_4/Fe_2O_3 nanocomposites, so no size compatibility problems produce. We did not know the meaning of MEB images? Maybe the disciplinary background is different to you and it is difficult for us to understand the MEB images.