Dear editor,

Thank you for your kind letter on my article (MS Number: nanomaterials-679748)! We also want to express our deep thanks to the reviewers of the positive comments. Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our research. We have revised the manuscript according to your kind advice and reviewer’s detailed suggestions. Enclosed please find the responses to the reviewers. Thank you very much for all your help and we are looking forward to hearing from you. If you have any question about this paper, please don’t hesitate to let us know.

Sincerely yours,

Xihui Zhao

E-mail address: zhaoxihui@qdu.edu.cn

Please find the following response to the comments of reviewers:

Response to reviewers' comments

[Reviewer 2]:

The manuscript by Wang et al describe the synthesis of carrageen-silver nanoparticles, their characterization and their use as potential biosensor for Cu^{2+} and S^{2-} determination.

[Comment 1]: The manuscript must be checked for proper English grammar, ideally by an English native speaker. There is a mix between past, present and conditional tense that makes it difficult for the reader to follow the manuscript in a logical way.

[Response]: Thanks for the reviewer’s kind advice. The spelling and syntax errors have been
checked and corrected carefully. The modifications have been marked in red color in the revised manuscript.

**[Comment 2]:** The authors should highlight the novelty of the carrageenan synthesis (if any) and the results of their characterization against relevant references not mentioned in their manuscript. For example:


Ideally the authors should discuss differences /similarities between their results and those obtained by Lobregas et al with respect to change in UV–vis absorbance Carr-AgNP solutions in the presence of different metal cations.

**[Response]:** Thanks for the reviewer’s kind suggestion. We have supplemented the discussion in the introduction of the revised manuscript and remarked in red color. (Line 57-63)

Elsupikhe R.F. et al. [28] reported the sonochemical synthesis of AgNPs with carrageenan as a stabilizer, but with high-intensity ultrasound radiation as reducing agent. Michaela Olisha S. Lobregas et al. [29] reported the preparation of gel-based AgNPs with carrageenan for the detection of Hg\(^{2+}\). However, using higher concentration of carrageenan, the solution was viscous or even gelatinous. The particles sizes of the prepared AgNPs were larger than 100 nm. Moreover, in the literature, there is no report on the synthesis of AgNPs using carrageenan for the duel ion detection of the Cu\(^{2+}\) and S\(^2\)-.

**[Comment 3]:** For the Experimental section, a more detailed presentation of the methods used for 2.3 Characterization should be presented. How were the samples prepared for each method/technique to allow for reproducibility of experiments by other researchers.

**[Response]:** Thanks for the reviewer’s kind suggestion. We have supplemented the method in the Experimental section of the revised manuscript and remarked in red color.

**[Comment 4]:** In Table S3, there seems to be a tendency for higher than expected recovery % of Cu and S. Any thoughts about why?

**[Response]:** Thanks for the reviewer’s kind suggestion. We have supplemented the discussion in the revised manuscript and remarked in red color. (Line 295-299)
Although carrageenan-AgNPs sensor has good selectivity and certain reliability under high ionic strength (Na⁺, K⁺, Cl⁻), other ions also have some influence, which probably leads to higher recovery than expected in actual water sometimes. However, it is generally acceptable. Therefore, based on the experiment results, we believed that carrageenan-AgNPs could be employed as probes for Cu²⁺ and S²⁻, which holds great potential in practical applications. (Line 295-299)

[Comment 5]: L30, will affect human health causing dizziness….
L17, Furthermore, it has …… ‘it” refers to what exactly?
L38-39, Delete this sentence, is similar to the one in L23-24
L43. Require time-consuming and complicated
L54, Carrageenans is a water-soluble
L66, All other reagents ….. from which company were they purchased?
L69 For the preparation of carrageenan-AgNPs, 1g k-carrageenan powder …. 
L88, 2.4 Colorimetric detection …
Fig 1. misspelling in X-axis Wavelength
Fig 2D. misspelling in Y-axis (particles)
Fig 3A. misspelling in Y-axis Transmittance
L140, … and the results are shown
L143, …carrageenan. A typical C=O …. galactose appeared at 1639 cm⁻¹ while the peak at 1384 cm⁻¹ …..
Fig 4A. misspelling in Y-axis Intensity
L174, The results are shown in Fig. 5
L175, Only Cu²⁺ induced the …. 
L185-186, The quantitiative analysis of Cu²⁺ indicated a linear correlation …. 
L191, and air-dried to
Fig 5C. The metal labels are too small to read
L209, In addition, there was good….. 
L212, The detection limit and linear …..
Fig 7C. The metal labels are too small to read
L239, delete manuscript
L255-256, …. and then spiked with different concentration of …..
L257, …. are shown in Table S3.
L261, carrageenan-AgNPs were further used

[Response]: Thanks for the reviewer’s kind advice. The spelling and syntax errors have been checked and corrected carefully. The revised Figures have been supplied in the revised manuscript. Modifications have been marked in red color in the revised manuscript.
[Comment 6]: Supplementary Fig S3. Is difficult to see the main change in color (yellow to transparent) on the strips

[Response]: Thanks for the reviewer’s kind advice. Details of the preparation of the paper-based sensors have been supplied in the experimental section and remarked in red color in the revised manuscript (Line: 109-112). And the further discussion has also been supplemented in the revised manuscript (Line: 210-215).

Additionally, carrageenan-AgNPs test strips were prepared. The filter papers were immersed in carrageenan-AgNPs solution and then air-dried. The lower half of the test strips were dipped into different solution for 20 s, and their color changes were observed by naked eyes, which were further used for Cu$^{2+}$ detection. (Line: 109-112).

The paper-based sensors were then dipped into different cation solutions for 20 s. Only with Cu$^{2+}$ solution caused obvious color change. Moreover, these test strips were used for sensing different concentrations of Cu$^{2+}$, and the obvious color change from yellow to colorless could be observed (Fig. S3). The results show that the detection limit of Cu$^{2+}$ on the test strip can be as low as $5 \times 10^{-5}$ M by naked eyes, which indicates that the strip sensor can be the potential candidate to conveniently monitor the concentration Cu$^{2+}$ in drinking water. (Line: 210-215).

Figure S3. Photographs of test strips of carrageenan-AgNPs to various concentration of Cu$^{2+}$. (The lower half of the test strips were dipped into different solution.)