Dear professor Ibnelwaleed A. Hussein,

Thank you very much for your letter and the comments from the referees about our paper (437309) submitted to Journal of Chemistry.

We have learned much from the reviewers' comments, which are fair, encouraging and constructive. After carefully studying the comments and your advice, we have made corresponding changes. The main revisions are listed as follows:

For reviewer 1

1. Structure of synthesized copolymer was analyzed only using FTIR which is not enough. NMR should be used for structure confirmation and possible copolymer composition. FTIR can be used as a supportive technique only.

The ^{1}H NMR spectrum of AM/AA/NSFM was recorded on a Bruker AC-E 200 spectrometer by dissolving the copolymer in D_2O and operating at 400 MHz. As shown in Figure 3, the ^{1}H NMR spectrum confirmed NSFM was introduced into the AM/AA copolymer. (Page 6, Figure 3)

2. Molecular weight of synthesized copolymer is not determined.

The weight-average molecular weight (M_w) of AM/AA and AM/AA/NSFM was obtained by static laser light scattering experiments in the revised manuscript. The M_w of AM/AA and AM/AA/NSFM is 1.33×10^7 g/mol and 1.32×10^7 g/mol, respectively. (Page 7, see supporting information)

3. It is claimed that AM-AA-SiO_2 has better viscosifying property than that of AM-AA copolymer (18.6 mPa·s vs. 8.7 mPa·s). It is very important to have knowledge of molecular weight which is not mentioned. How sure authors are that molecular weight of both polymers is same. May be this slightly high viscosity is due to difference in molecular weight and not due to nano particles which need to be confirmed.

The static laser light scattering experiments were conducted in order to study the molecular weight of synthesized copolymers. The results of this experiments show that the difference in molecular weight of AM/AA and AM/AA/NSFM is small. (Page 7, see supporting information)

4. In introduction section authors state, "However, there are no reports about the application of nano-SiO_2 in polymer for flooding to develop temperature tolerance, salt tolerance, and shear resistance of copolymer in the literature". But later in section 3.9 authors state "This is to say the AM/AA/NSFM solution has a stronger mobility control ability which is favorable to enhanced oil recovery due to the higher viscosity

retention rate and microstructure [26, 28]". These two statements contradict to each other and confusing.

The authors of the two references hold that stronger mobility control ability is favorable to enhanced oil recovery. The two references were labeled because the above conclusion is quoted in manuscript. We now realize that this conclusion is widely accepted. So the label is deleted in the revised manuscript in order to avoid contradiction and confusion. (Page 10)

5. Many instances of bad English. For example
a. The copolymers were dissolving in distilled water.
b. The viscoelasticity curves of AM/AA and AM/AA/NSFM solutions (0.2 wt %) were shown in Figure 7.
c. The injection rate of saline water (sodium chloride concentration was 0.5wt %) and polymer solution which was prepare by dissolving polymer in saline water is…

a. The copolymers were dissolved in distilled water.
b. The viscoelasticity curves of AM/AA and AM/AA/NSFM solutions (0.2 wt %) are shown in Figure 7.
c. The injection rate of brine (sodium chloride concentration was 0.5 wt %) and polymer solution which was prepared by dissolving polymer in the brine is…

For reviewer 7

1. 2.5 Viscosity measurements: I am wondering why you used the Ubbehold capillary viscometers tube to measure the viscosity. This viscometer only for Newtonian low viscosity fluids such as salts, etc. I do not trust the results of this viscometer in the case of copolymers. How did you calibrate this viscometer? Also this viscometer measures the time, where is the equation you have used to convert it to viscosity because you need the density. I did not see density measurements for the copolymer.

The intrinsic viscosity is an important parameter for the characterization of copolymer molecular weight. We want to study the molecular weight of the copolymer by using the intrinsic viscosity. The method used to measure the intrinsic viscosity in the manuscript is introduced by Prof. Bohandanecky and Chen. And this method also is used in many studies for measuring the intrinsic viscosity of polymer solution. However, I must admit that this method has certain limitation in the determination of intrinsic viscosity. So the static laser light scattering experiments were conducted in order to obtain more accurate molecular weight of synthesized copolymers. And the part about intrinsic viscosity measurement is removed in the revised manuscript. (Page 7)

1. M. Bohdanecky, J. Kovar. Viscosity of Polymer Solutions; Elsevier, Amsterdam/Oxford/New York, 1982.

2. T.L. Chen, W.F. Pu. Application evaluation methods of polymer; Petroleum Industry Press, Beijing, 1996.
3. A. Lana, S.Q. Wang, Z.H. Xu, M. Jacob. “Adsorption kinetics of a novel organic–inorganic hybrid polymer on silica and alumina studied by quartz crystal microbalance,” The Journal of Physical Chemistry C, vol. 115, pp. 15390-15402, 2011.
4. X.J. Liu, W.C. Jiang, S.H. Gou, et al. “Synthesis and evaluation of novel water-soluble copolymers based on acrylamide and modular β-cyclodextrin,” Carbohyd. Polym., vol. 96, pp. 47-58, 2013.

2. Section 2.8: why you did not use actual core samples where a lot of clay minerals will be there? Your matrix only is quartz which is not the real case. I recommend running a flooding test using Berea sandstone core which is a standard typical sandstone formation. Also, what did you mean by oil apparent viscosity at certain shear rate? Does the oil viscosity change with shear rate? It is a Newtonian fluid. Why the core saturated only with NaCl why not formation brine where we have Ca, Mg, Na, etc.?

The quartz sand was used to avoid the effect of clay minerals on flooding experiments. In fact there are a large number of clay minerals in reservoir rocks. Thus, two Berea sandstone cores were used in core flooding experiments. And the redundant information about the oil (shear rate 7.34 s^{-1}) is deleted in the revised manuscript. The brine (containing Ca^{2+}, Mg^{2+}, Na^{+}, etc.) was used in the Berea sandstone cores flooding experiments. (Page 5)

3. In all figures I do not see X-axis title, this is not good.

There are not X-axis titles in all figures probably due to the difference of office software versions. A PDF file of the revised manuscript will be uploaded to avoid this problem.

4. Section 3.7: what is the unit of salt concentration? Is it ppm? Why you did not combine the three salts Mg, Ca, Na in one solution and study their effect on the viscosity?

The unit of salt concentration is mg/L (or ppm). We want to study the effect of each salt on the viscosity of copolymer solution. So the three salts (NaCl, $CaCl_2$, and $MgCl_2 \cdot 6H_2O$) are not mixed in the salt tolerance experiments.

5. Section 3.10 Enhanced oil recovery: what is the permeability of the sand pack? What is the back pressure, porosity, injection rate? The coreflooding set-up/experiment was poorly described. From Fig. 10 I can conclude that there is adsorption and it was higher in the case of AM/AA/NSFM more than AM/AA. The pressure drop in the water flooding at the end was higher in the AM/AA/NSFM which

means we have damage due to permeability reduction (which might be attributed to the adsorption or retention of the copolymer inside the sand pack). I suggest measuring the polymer concentration in the effluent analysis and doing material balance calculations to determine the amount of polymer loss during the flooding process.

The permeability, porosity, length and diameter of Berea sandstone cores are listed in Table 1. The injection rate and the back pressure are illustrated in the revised manuscript. And the core flooding set-up and experiment flow chart are described in detail. In addition, material balance calculations are conducted to study the retention of copolymer. It is found that AM/AA/NSFM exhibits higher retention than AM/AA (83 mg vs. 55 mg). (Page 5, 10 and 11)

Required technical English and paper formatting include and not limited to:

1. In the introduction part: first line replace the word a very by an.

Polymer flooding plays an important role in the field of enhanced oil recovery (EOR).

2. Line 4 in the introduction part, it is not good to start the sentence with the word especially.

Furthermore, PAM and HPAM have poor shear resistance. Polymer molecular chains will be cut off when polymer solution passes through the pump, pipeline, perforation, and porous medium at high speed, so the viscosity of polymer solution will be greatly reduced.

3. Line 5, what do you mean by dramatical shear effect? Is it shearing thinning?

Polymer molecular chains will be cut off when polymer solution passes through the pump, pipeline, perforation, and porous medium at high speed.

4. Line 7, many research works, remove S from work. Actually this sentence is very long to the reader; please break down to at least two sentences.

Recently, many studies have demonstrated that performance of composite material could be significantly improved by combination or copolymerization with a functional monomer containing nano-SiO_2. The composite material containing Nano-SiO_2, such as polyethylene terephthalate, styrene butadiene rubber, polyaniline, polyimide, and nylon 6, may exhibit more satisfactory thermal stability, toughness and strength owing to the effect of physical adsorption, hydrogen bond, Si-O bond, and C-Si bond.

5. Line 11, can help to enhance, remove to and it is can help enhance.

The sentence is removed in the revised manuscript.

6. Lines 12, the word report repeated many times, replace it by papers, previous work, etc.

However, there are no papers about the application of nano-SiO_2 in polymer for flooding to develop temperature tolerance, salt tolerance, and shear resistance of copolymer.

Page 2:

1. Line 3, this word should be that aims to instead of aim to.

Keeping in mind of these fundamental conditions, herein, a novel nano-SiO_2 functional monomer (NSFM, see Scheme 1) was introduced into AM/AA copolymer aiming to obtain satisfying temperature tolerance, salt tolerance and shear resistance.

2. Part 2. Experimental: 2.2 line 4, should be which was separated not were.

After reaction, the product was NSFM which was separated by centrifugation and washed with distilled water.

Section 3.5: Shear resistance: line 1: are shown not were shown.

The viscosity vs. shear rate curves of AM/AA and AM/AA/NSFM (0.2 wt%) are shown in Figure 6(a).

In addition, other errors also were changed accordingly in the revised manuscript. And the author order was adjusted with all the authors' agreement.

Thank you for your patience and help. And please do not hesitate to contact me if there are any questions in our revised manuscript.

Best regards,

Xiaoping Qin