

Supporting Information

Influence of HPAM molecular weight on the cross-linking reaction of HPAM/Cr³⁺ and transportation of HPAM/Cr³⁺ in micro-fractures

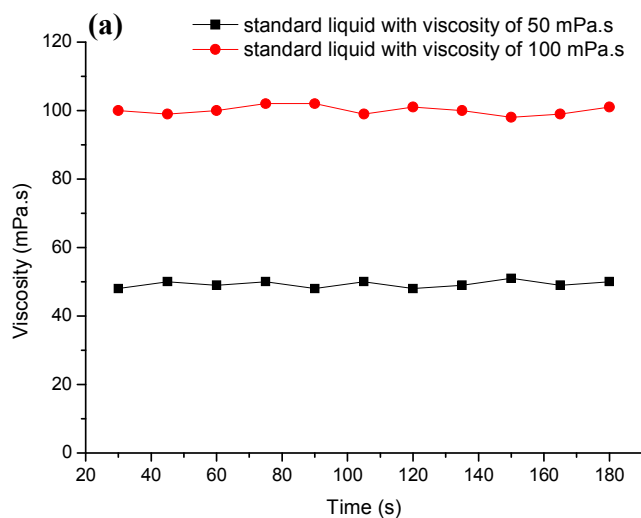
Lei Zhang,^{*,†,‡} Liming Zheng,^{†,‡} Jingyang Pu,[§] Chunsheng Pu,^{*,†,‡} and Shuxia Cui^{†,‡}

[†]Institute of Petroleum Engineering and [‡]Research center of physical-chemical engineering and technology on the development of complex reservoirs, China University of Petroleum (East China), Qingdao 266580, China

[§]Department of Geosciences and Geological and Petroleum Engineering, Missouri University of Science and Technology, Rolla 65409, Missouri, United States

S1. Calibrations of the viscometer

Calibrations of the viscometer are done by using five standard fluids of silicon oil with viscosities of 50, 100, 500, 1000, and 5000 mPa.s and a standard fluid of mineral oil with viscosity of 11000 mPa.s, which can match with the viscosity ranges of the HPAM/Cr³⁺ systems in the experiment. Then a suitable spindle is selected according to the viscosity value to give viscosity reading between 10% and 100% of full scale range. The results of viscosity measurement are shown in Fig. S1. From Fig. S1a, b, and c, it can be observed that the viscosity readings are within the allowable 1% deviation of the viscosities of the used standard fluids. Thus, the selected parameters of the viscometer can be used to measure the viscosities of the HPAM/Cr³⁺ systems.



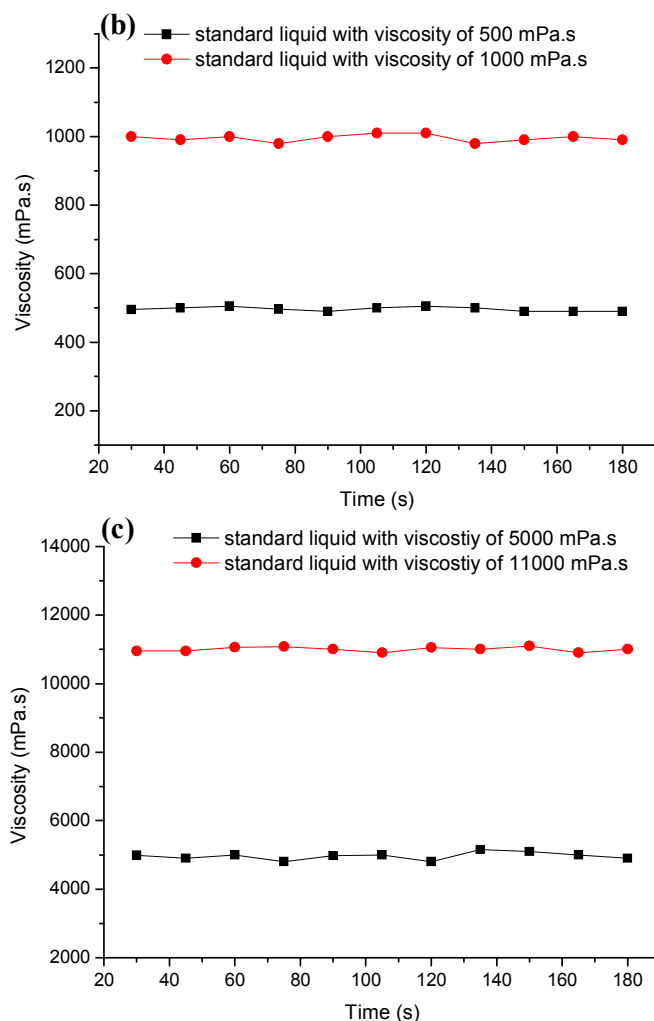


Fig. S1 The measured viscosities of standard liquids by DV-III Brookfield viscometer at room temperature in the experiment. (a: the measured viscosities of two standard fluids of silicon oil with viscosities of 50 and 100 mPa.s; b: the measured viscosities of two standard fluids of silicon oil with viscosities of 500 and 1000 mPa.s; c: the measured viscosities of a standard fluid of silicon oil with viscosity of 5000 mPa.s and a standard fluid of mineral oil with viscosity of 11000 mPa.s.)

S2. AFM and SEM images of HPAM and the system of HPAM/Cr³⁺

The AFM and SEM images of HPAM and the system of HPAM/Cr³⁺ are shown in Fig. S2, Fig. S3, and Fig. S4. Fig.S2 shows the AFM images of HPAM and the system of HPAM/Cr³⁺ by intramolecular cross-linking.¹ Fig. S3 shows the SEM images of HPAM and the system of HPAM/Cr³⁺ by intramolecular cross-linking.²⁻⁴ Fig.S4 shows the SEM images of the system of HPAM/Cr³⁺ by intermolecular cross-linking.⁵ From Fig. S2 and Fig. S3, it can be observed that there is no obvious difference before and after intramolecular cross-linking. However, by comparing Fig. S4 to Fig. S3, it can be observed that the morphology of the system of HPAM/Cr³⁺ after intermolecular cross-linking is apparently different from that of HPAM or the system of HPAM/Cr³⁺ after intramolecular cross-linking.

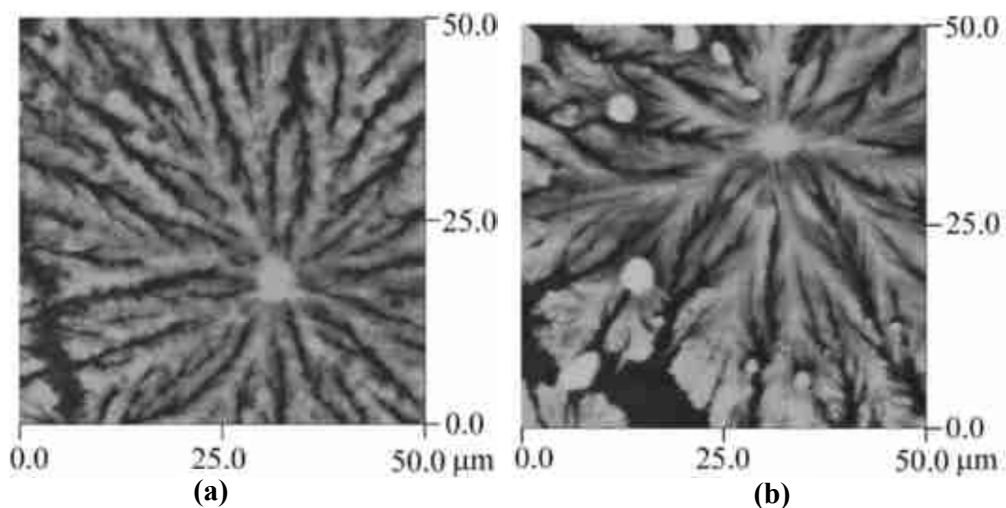


Fig. S2. AFM images of HPAM and the system of HPAM/Cr³⁺ by intramolecular crosslinking. (a: the morphology of HPAM; b: the morphology of the system of HPAM/Cr³⁺ by intramolecular crosslinking.) (Chen et al.¹)

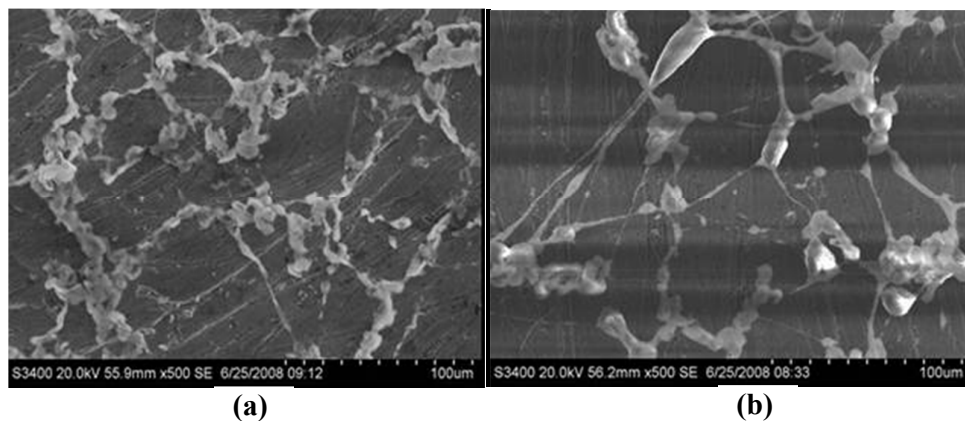


Fig. S3. SEM images of HPAM and the system of HPAM/Cr³⁺ by intramolecular crosslinking. (a: the morphology of HPAM; b: the morphology of the system of HPAM/Cr³⁺ by intramolecular crosslinking.) (Lu et al.²; Jiang et al.³; Lu et al.⁴)

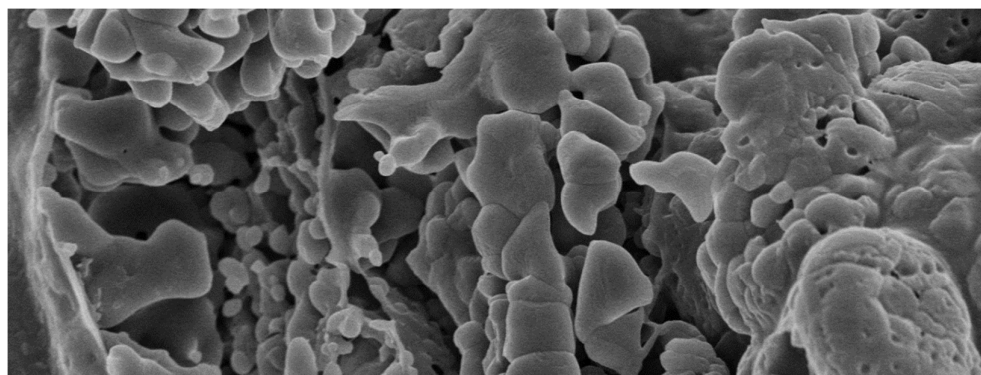


Fig. S4 SEM image of the system of HPAM/Cr³⁺ by intermolecular crosslinking. (Yu et al.⁵)

AUTHOR INFORMATION

*Corresponding author: Lei Zhang, No. 66, Changjiang West Road, Huangdao District, Qingdao, Shandong 266580, China. E-mail: zhangshishishi.188@163.com.

**Corresponding author: Chunsheng Pu, No. 66, Changjiang West Road, Huangdao District, Qingdao, Shandong 266580, China. E-mail: chshpu@163.com.

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