

Supporting Information

1. Physical properties of Tahe crude oil

The physical properties are shown in Table S1.

Table S1. Physical properties of Tahe crude oil

Saturates (wt%)	Aromatics (wt%)	Resins (wt%)	Asphaltenes (wt%)	R/A ratio	Density (g/cm ³)
30.7	34.4	5.1	29.8	0.39	0.962

2. Appearance of the synthesized products

Although our purpose is to synthesize the copolymers of POA-VA, POA-MA and POA-ST, the homopolymers of OA, VA, MA and ST might be obtained as well. But there were evidences that prove the successful synthesis of the copolymers. Firstly, the synthetic products shared similar appearance, which were all translucent, milky and crispy blocks. To our knowledge, the polyvinyl acetate (PVA) should be colorless liquid or transparent glassy particles with light yellow color. The polymaleic anhydride (PMA) should be transparent liquid with brown or red color. The polystyrene (PS) should be colorless thermoplastic. From the pictures shown in Figure S1, it is easy to distinguish the synthesized OA polymers from the homopolymers of PS, PVA or PMA.





Figure S1. Appearance of the synthesized products: (a) POA; (b) POA-VA; (c) POA-MA; (d) POA-ST

3. Dynamic interfacial tension (DIFT) of the blank interface

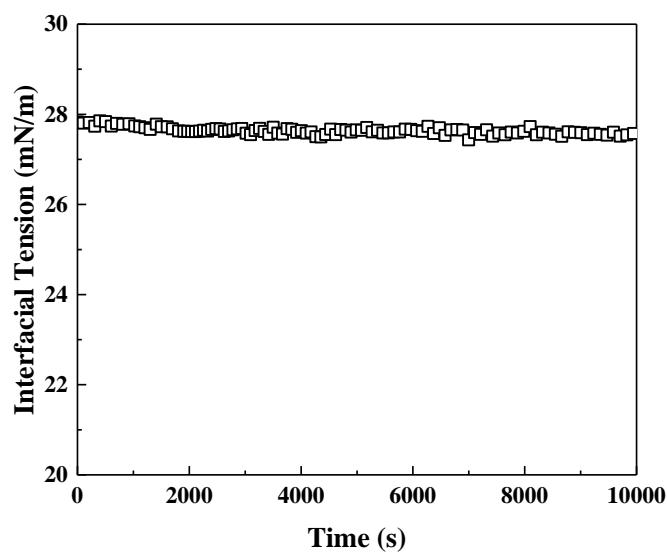
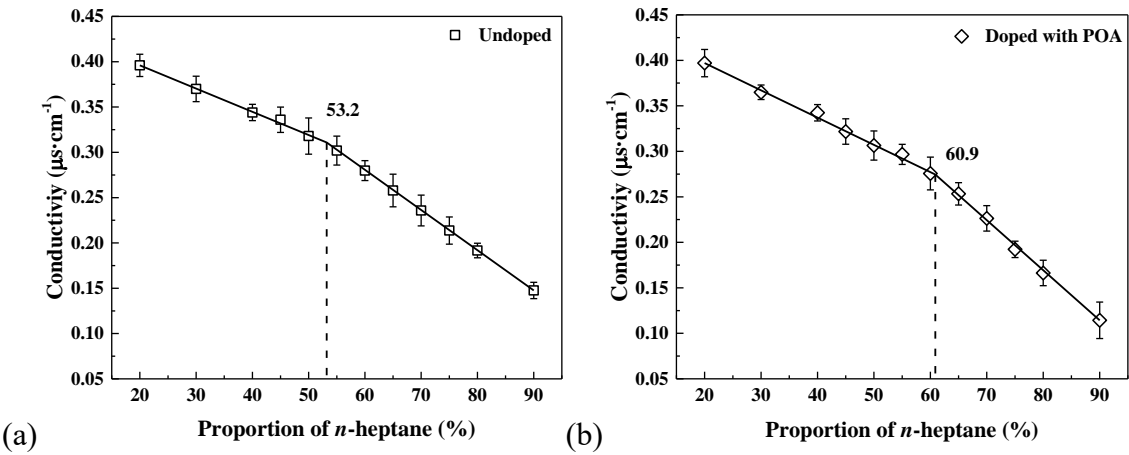


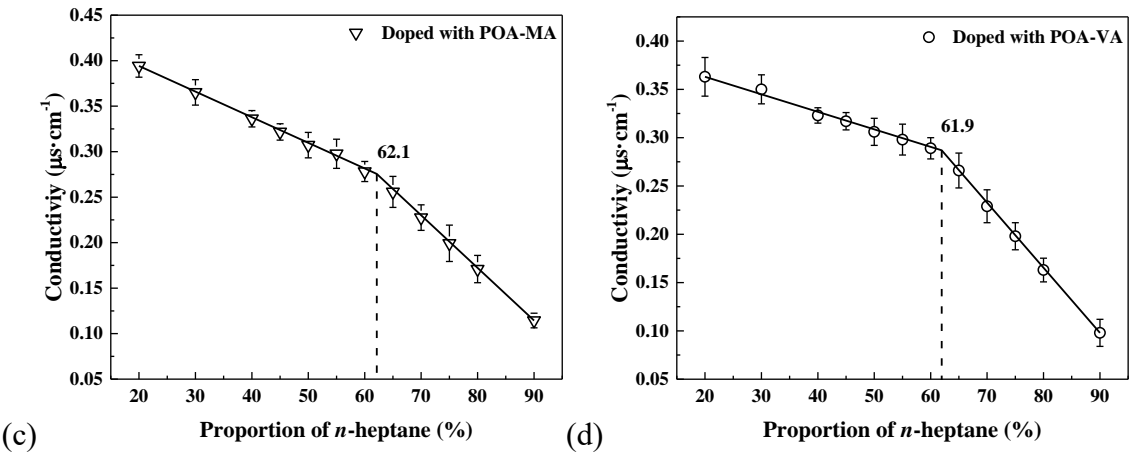
Figure S2. DIFT of the blank interface

22 **4. Absolute values of the conductivity experiment.**

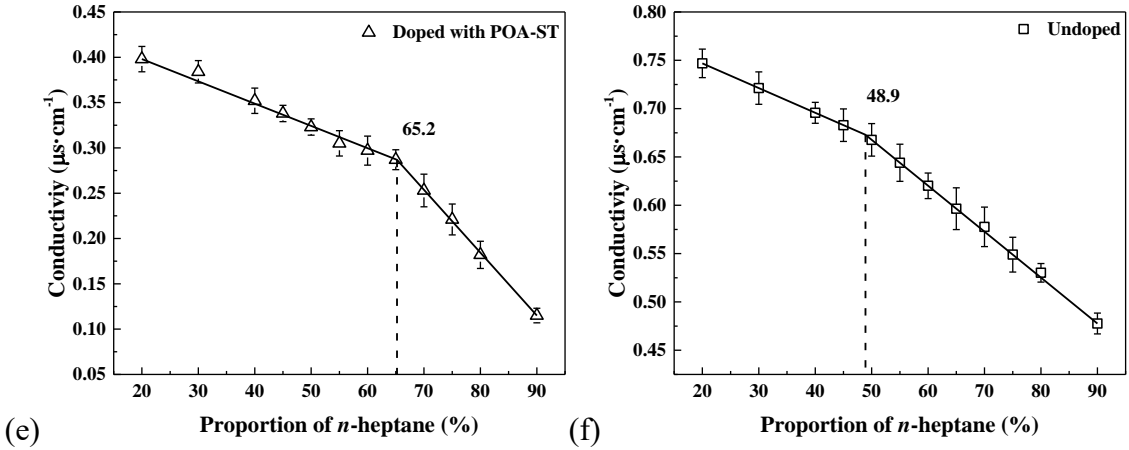
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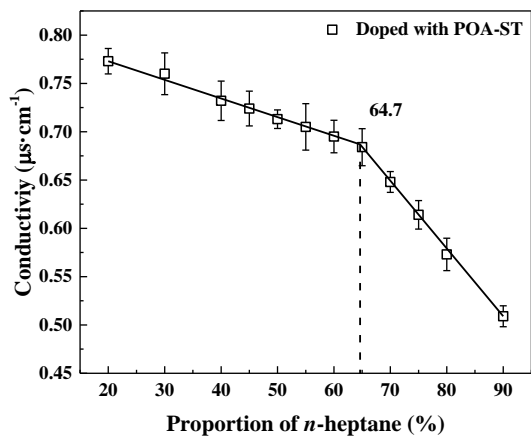
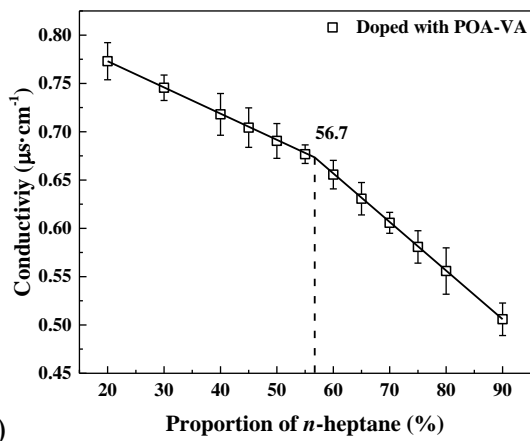
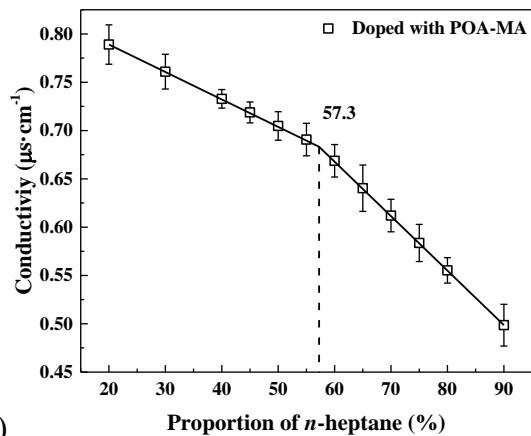
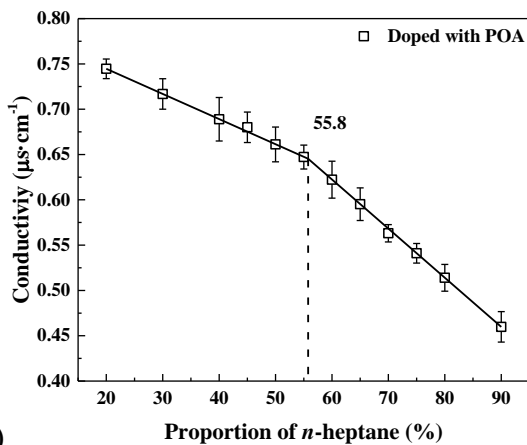


Figure S3. Absolute conductivity values of the asphaltene solutions: (a)-(e) asphaltene concentration of 500 ppm, (f)-(j) asphaltene concentration of 5000 ppm

5. Modification of the micrographs of the model oils

With the purpose of quantitative comparison, the micrographs of the model oils containing asphaltenes and OA polymers modified with the method of image binarization. The threshold of binarization is set as 185 (the whole range from 0 to 255). The modified figures were shown in Figure S4.

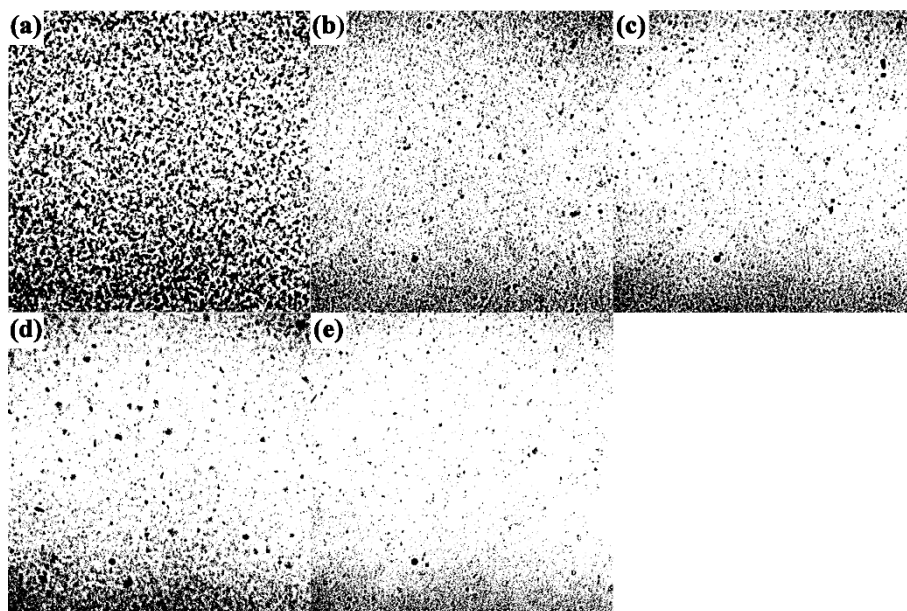


Figure S4. Modified micrographs of the model oils containing asphaltenes and OA polymers: (a) sole asphaltenes; (b) doped with POA; (c) doped with POA-VA; (d) doped with POA-MA; (e) doped with POA-

ST