Supporting Information

Graphene Oxide Nanosheets for Oil Recovery

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Supporting Figures:

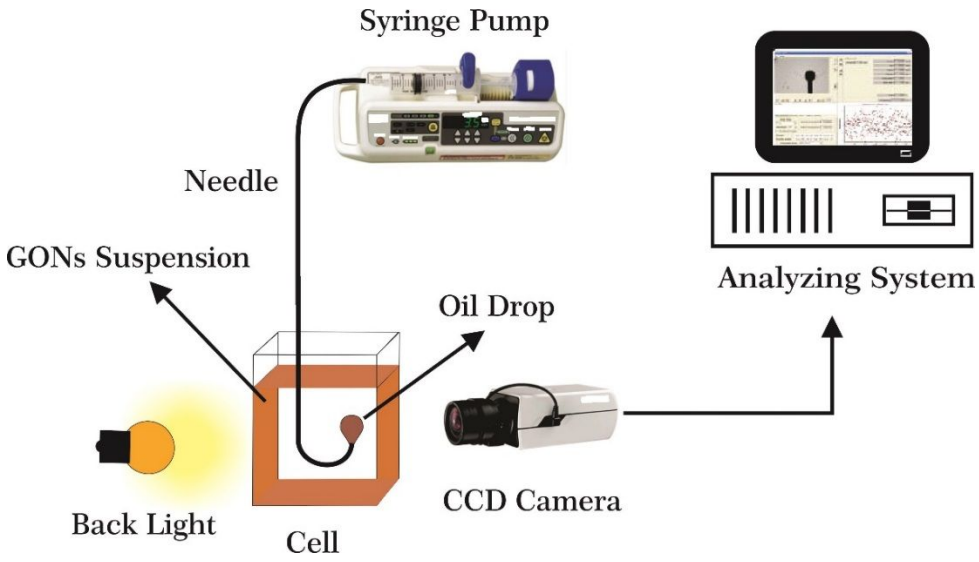

Figure S1. A graphic illustration of the IFT measurement instruments.

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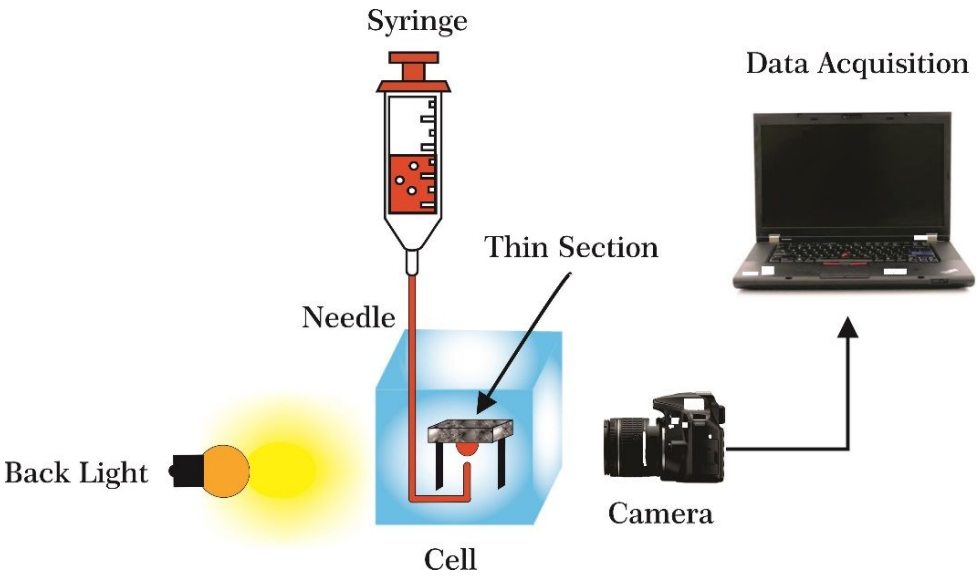

Figure S2. Showing different parts of the CA measurement system in a simple way

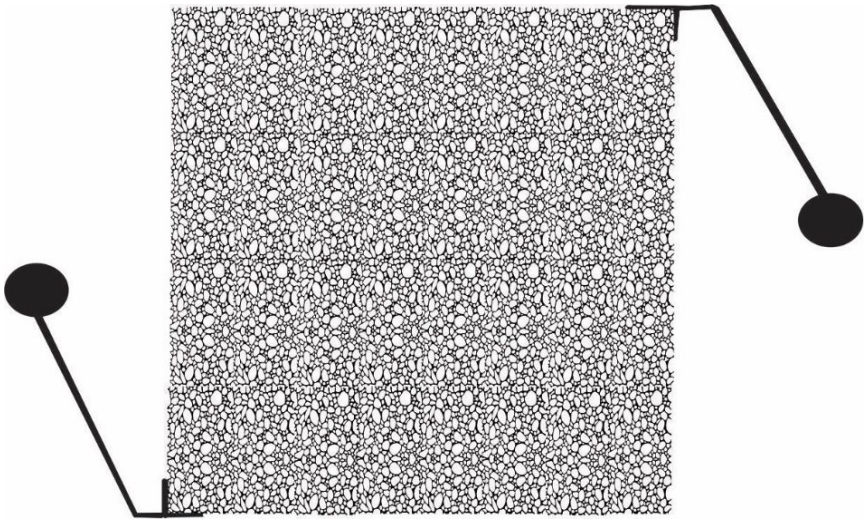

Figure S3. Image of the pattern, which was used to make the glassy micro-model.

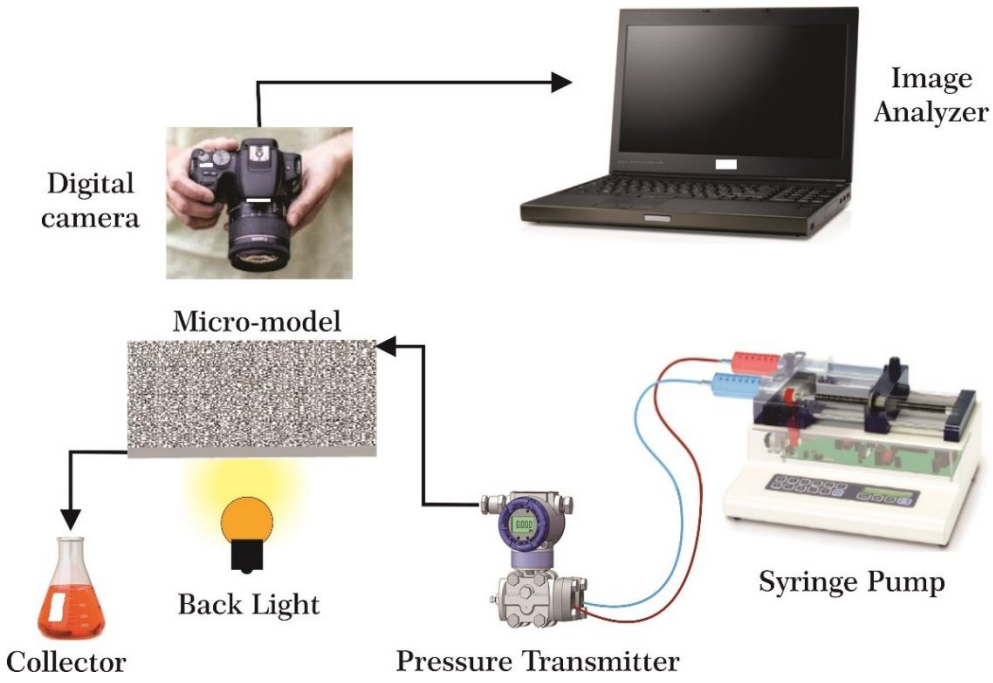

Figure S4. Various schematized parts of the glassy micro-model setup

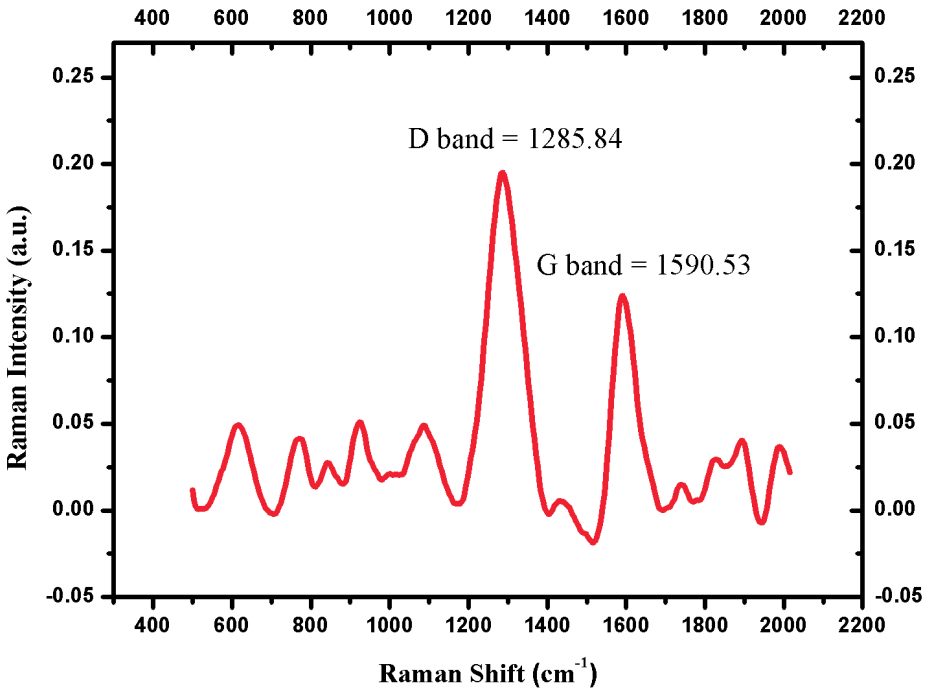

Figure S5. Raman spectroscopy of GONs.

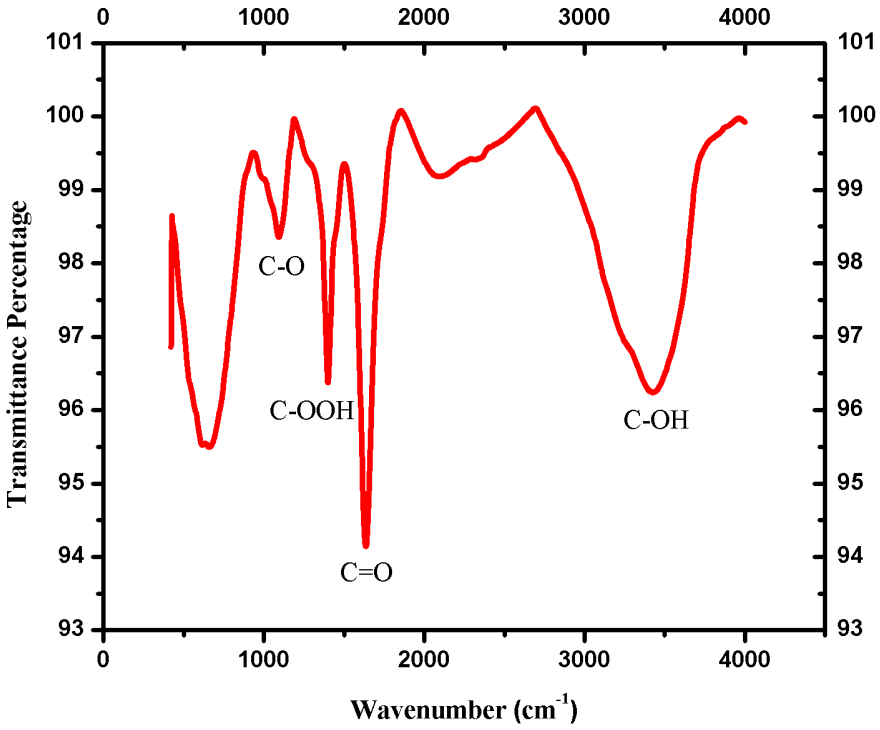

Figure S6. FT-IR spectroscopy analysis of GONs

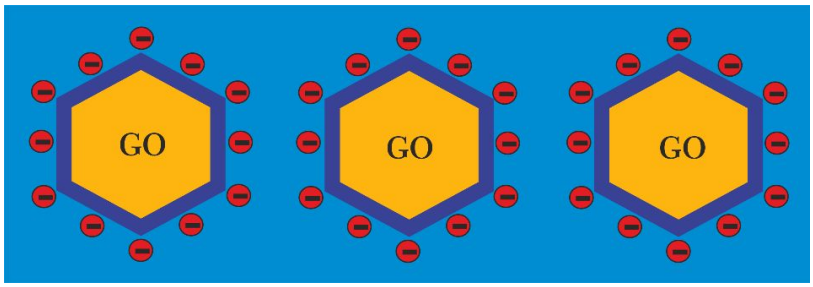

Figure S7. A representational picture of GO sheets after dispersing in the aqueous phase.

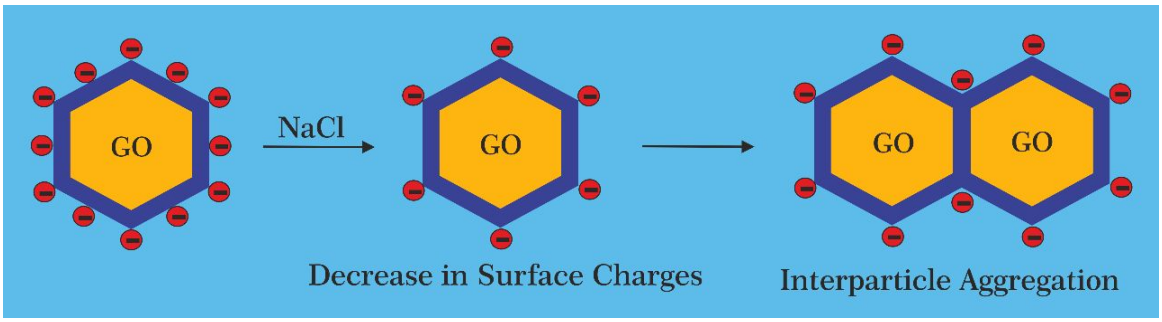

Figure S8. A simplified representation of how Na+ ions influence GONs aggregation.

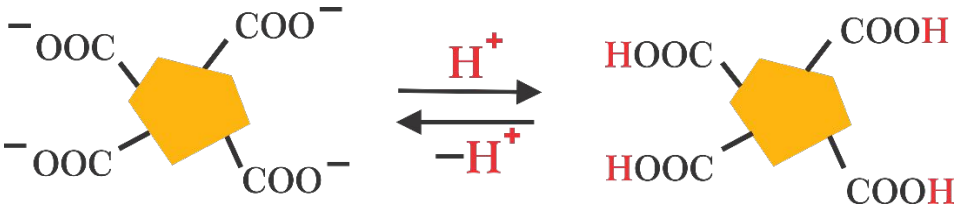

Figure S9. pH effect on protonate and deprotonate of GONs –COOH groups.

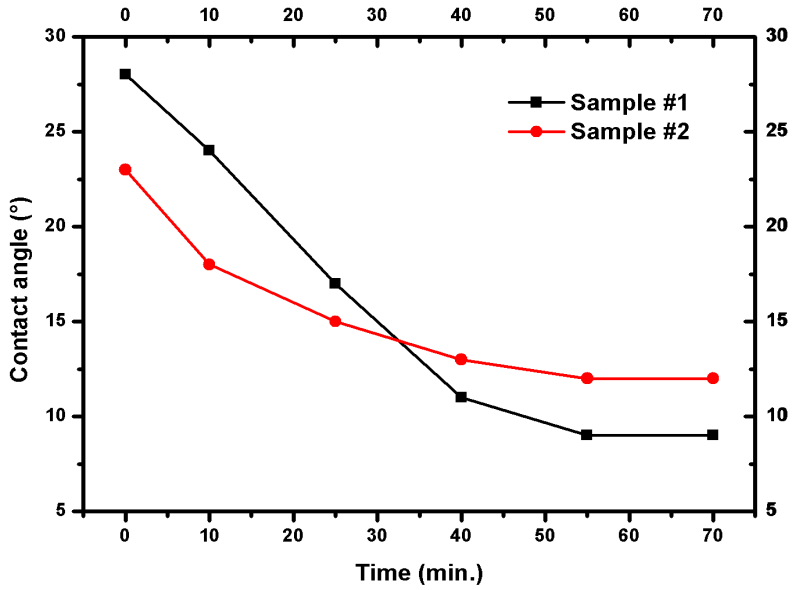

Figure S10. Effect of inertia time on CA for two samples aged in crude oil.

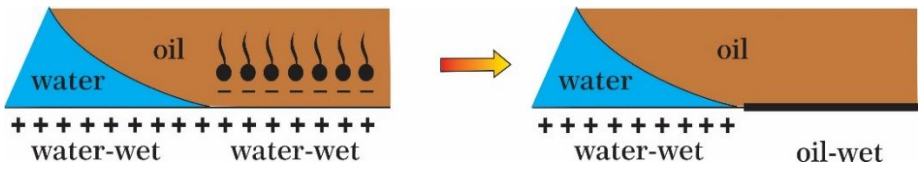

Figure S11. A simple schematic of how to absorb acidic compositions of crude oil on carbonate surface.

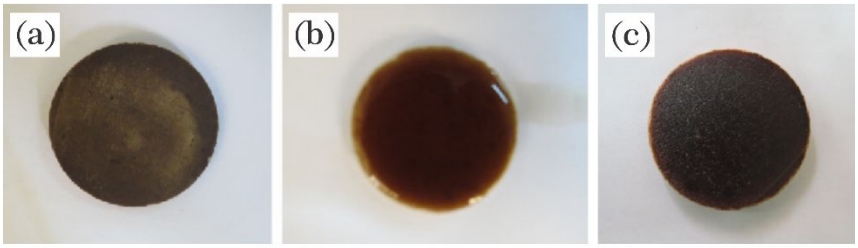

Figure S12a-c. Images of a) an oil-wet sample, b) the sample after spreading some drops of GONs suspension, c) when it was dried for 24 hours to make GONs film.

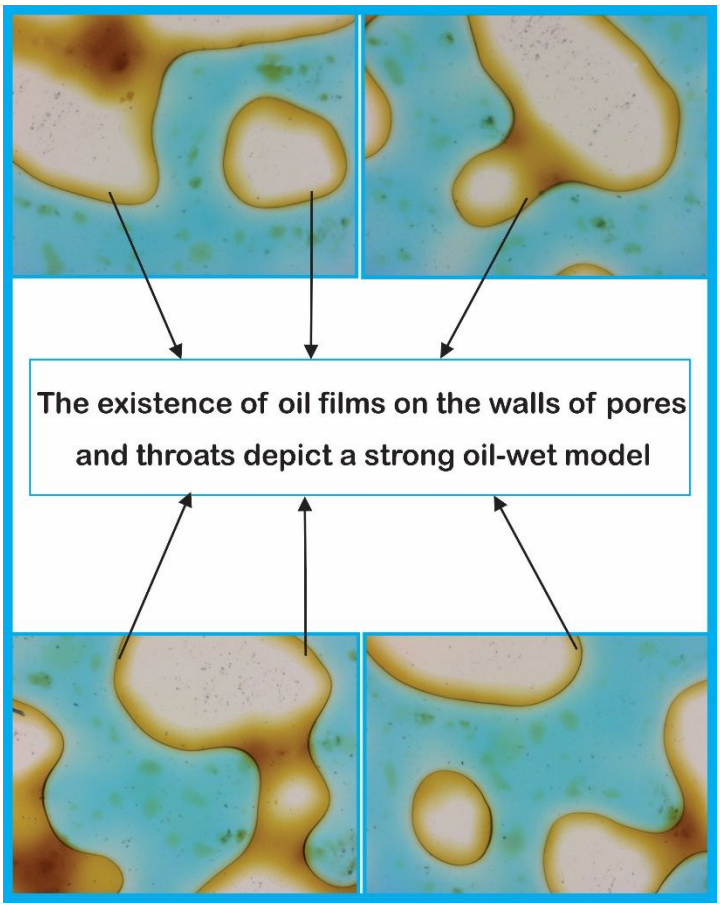

Figure S13. Oil and water distribution throughout brine flooding.

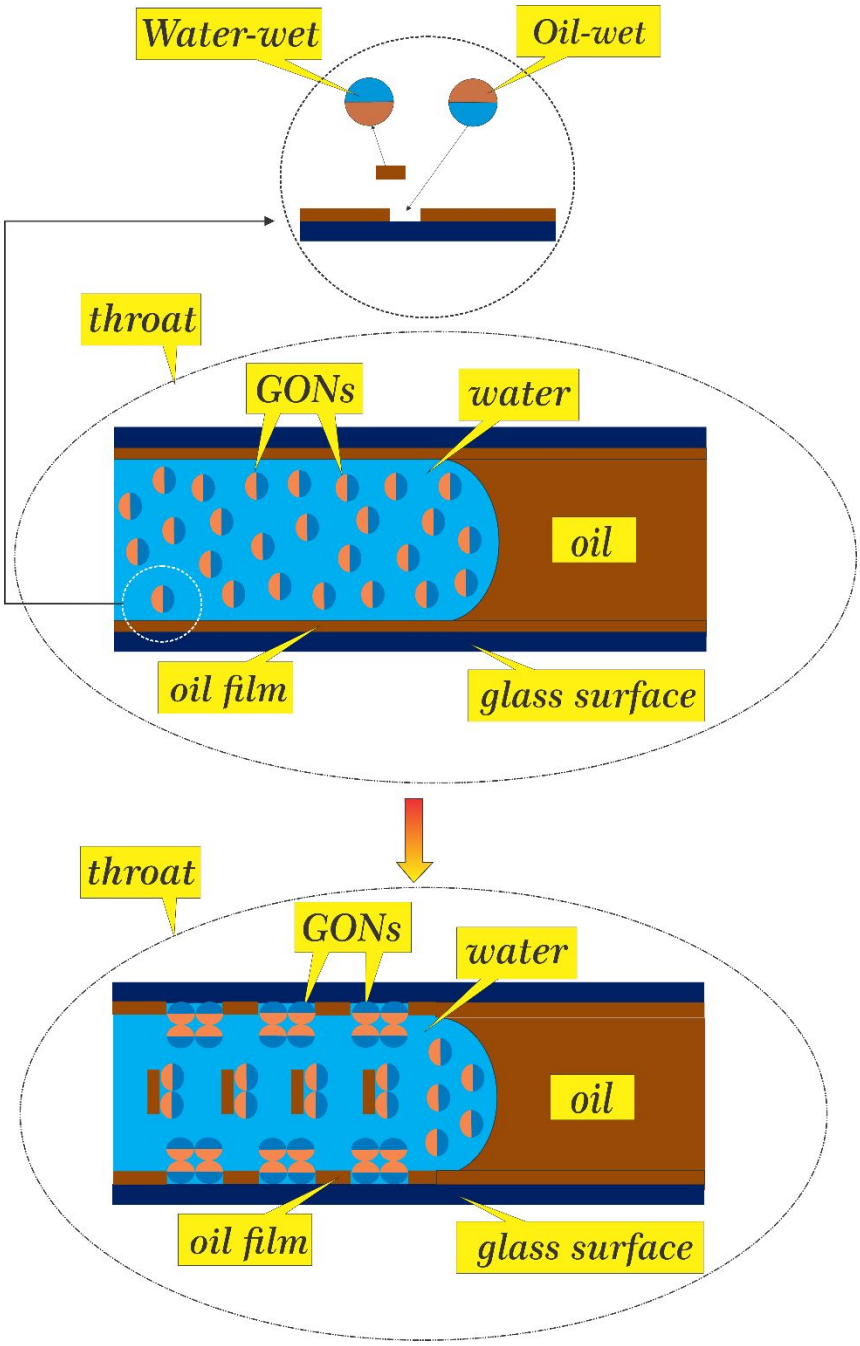

Figure S14. How the wettability alteration using the amphiphilicity property of GONs.

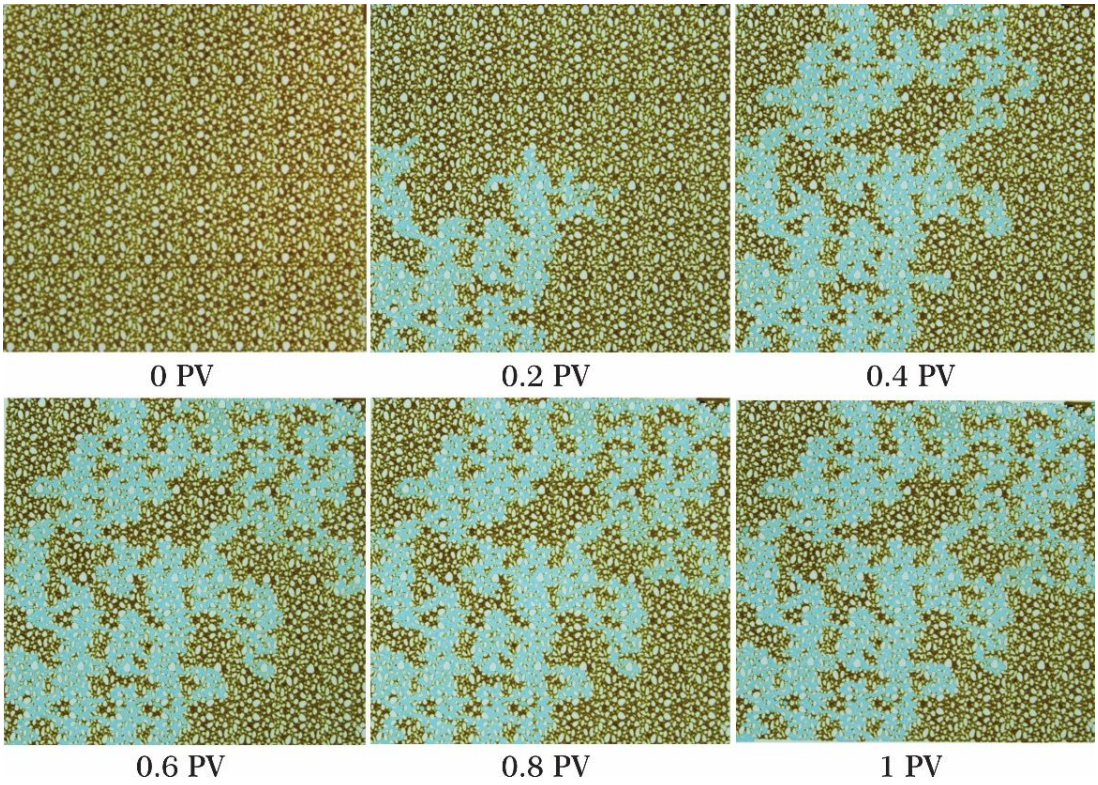

Figure S15. Macroscopic images of brine flooding.

Supporting Tables:

Table S1. The properties of the crude oil

Physical properties at 14.7 psia and 60 F	Value
CH_4	0.02 Mol.%
C_2H_6	0.12 Mol.%
C_3H_8	1.48 Mol.%
iC_4H_{10}	3.09 Mol.%
nC_4H_{10}	3.20 Mol.%
iC_5H_{12}	3.06 Mol.%
nC_5H_{12}	3.81 Mol.%
C_6H_{14}	6.36 Mol.%
$C_7H_{16}^+$	78.38 Mol.%
H_2S	0.48 Mol.%
Viscosity	10 cp.
Density	0.845gr/cc

Table S2. Different concentrations of GONs and NaCl salt which were used in the experiments.

GONs concentration (ppm)	NaCl salt concentration (ppm)	NaCl salt concentration (ppm)	NaCl salt concentration (ppm)	NaCl salt concentration (ppm)
0	20,000	30,000	40,000	60,000
100	20,000	30,000	40,000	60,000
200	20,000	30,000	40,000	60,000
300	20,000	30,000	40,000	60,000
400	20,000	30,000	40,000	60,000
500	20,000	30,000	40,000	60,000
600	20,000	30,000	40,000	60,000
700	20,000	30,000	40,000	60,000
800	20,000	30,000	40,000	60,000

Table S3. Some properties of the micro-model used in flooding tests.

Length (cm)	width (cm)	Average depth (μm)	Pore volume (cm^3)	Porosity (%)	Permeability (md)
6	6	70	0.21	0.40	1,800

Table S4. Measured amounts of pH and IFT at a constant concentration of GONs (400 ppm) and various concentrations of NaCl

NaCl concentration (ppm)	0	20,000	40,000	60,000
pH	3.5	2.95	2.85	2.75
IFT (mN/m)	21.7	19.2	17.1	-

Table S5. pH values of various concentrations of GONs suspension in absence of NaCl.

GONs concentration (ppm)	100	400	800
pH domain	4.7-4.8	3.45-3.51	3.1-3.2

Table S6. pH values of 400 ppm of GONs suspension and different values of NaCl.

NaCl concentration (ppm)	200,000	40,000	60,000
pH domain	2.95-3	2.8-2.84	2.7-2.73