

Lab on a Chip Supplementary Information

Title: Quantitative analysis of phase topology evolution during three-phase displacements in porous media

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S.1 Topological parameters

Table S.1. Topological parameters of WAG1 experiment at the end of each injection period.

	OI	WF1	GF1	WF2	GF2	WF3
S_w	0.3526	0.5655	0.3492	0.5430	0.3359	0.4954
S_o	0.6473	0.4345	0.4460	0.3600	0.3744	0.3179
S_g	0.0000	0.0000	0.2048	0.0970	0.2897	0.1866
χ_w	371.00	-129.00	238.00	-213.00	303.00	-54.000
χ_o	-63.000	114.00	305.00	251.00	361.00	312.00
χ_g	-	-	14.000	28.000	42.000	38.000
$\hat{\chi}_w$	0.6587	0.9033	0.7296	0.9347	0.6874	0.8806
$\hat{\chi}_o$	0.8784	0.8096	0.7291	0.7266	0.6756	0.6723
$\hat{\chi}_g$	-	-	0.8467	0.8046	0.8320	0.8209
S_{cw}	0.1152	0.8059	0.2773	0.7549	0.1130	0.8045
S_{co}	0.9440	0.1032	0.1092	0.0660	0.0407	0.0510
S_{cg}	-	-	0.3248	0.0915	0.2066	0.0919
α_w	465010	281806	535614	309255	602715	353349
α_o	253276	366814	387411	440177	486959	493849
α_g	-	-	179124	1897289	213848	201200

Table S.2. Topological parameters of SAG experiment at the end of each injection period.

	OI	WF1	GF1	WF2	GF2	WF3
S_w	0.3368	0.6148	0.2934	0.6279	0.1635	0.4098
S_o	0.6631	0.3852	0.5059	0.2851	0.3574	0.2465
S_g	0.0000	0.0000	0.2007	0.0870	0.4791	0.3437
χ_w	394.00	-224.00	81.000	-644.00	604.00	-134.00
χ_o	-137.00	150.00	708.00	854.00	707.00	958.00
χ_g	-	-	18.000	37.000	23.000	67.000
$\hat{\chi}_w$	0.6363	0.9294	0.8070	1.0557	0.1541	0.9222
$\hat{\chi}_o$	0.8992	0.7854	0.5924	0.2874	0.4818	0.1171
$\hat{\chi}_g$			0.8426	0.7784	0.8506	0.8225
S_{cw}	0.0506	0.7762	0.1303	0.9122	0.0518	0.7557
S_{co}	0.9917	0.1140	0.0910	0.0507	0.0671	0.0427
S_{cg}	-	-	0.6711	0.3105	0.3122	0.1935
α_w	516358	228360	941913	292466.6	197380	194721
α_o	262238	364442	563545	630690.6	211484	185537
α_g	-	-	148711	195357	126122	147052

Table S.3. Topological parameters of WAG2 experiment at the end of each injection period.

	OI	WF1	GF1	WF2	GF2	WF3
S_w	0.1557	0.4053	0.2638	0.4057	0.2589	0.4250
S_o	0.8442	0.5946	0.5950	0.5209	0.5361	0.4800
S_g	0.0000	0.0000	0.1411	0.0733	0.2049	0.0950
χ_w	662.00	464.00	790.00	579.00	791.00	523.00
χ_o	-217.00	94.000	144.00	216.00	245.00	237.00
χ_g	-	-	24.000	34.000	42.000	54.000
$\hat{\chi}_w$	0.0475	0.6410	0.2877	0.5870	0.2760	0.6247
$\hat{\chi}_o$	0.9089	0.8295	0.8135	0.7805	0.7724	0.7654
$\hat{\chi}_g$	-	-	0.8272	0.7712	0.8206	0.7512
S_{cw}	0.0388	0.3589	0.0534	0.5415	0.0320	0.4975
S_{co}	0.9943	0.2737	0.5200	0.0970	0.1426	0.1112
S_{cg}	-	-	0.4306	0.1509	0.4785	0.1135
α_w	413137	297297	488735	353803	504420	334166
α_o	76198	202654	239124	282786	281184	304144
α_g	-	-	158276	231299	179722	229445

S.2 EOS approach to model three phase relative permeability

The value of ϕ_r as defined by Khorsandi et al. (2017) is calculated for the oil phase in the three experiments.

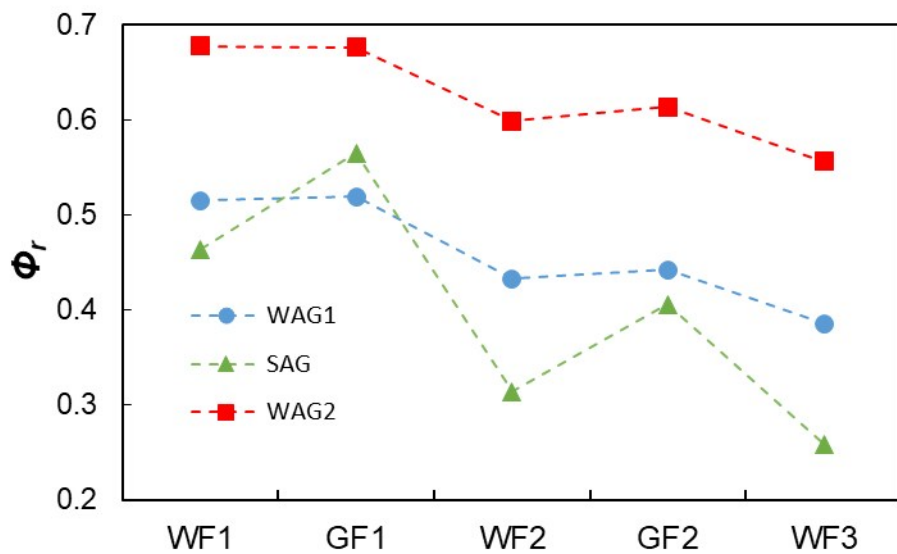


Fig S1. The value of ϕ_r for oil phase in the three experiments. The value of ϕ_r keep decreasing in each cycle.