Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Effect of Subcritical Water on Homogeneous Catalysis of Used Cooking Oil Hydrolysis

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Table S1. Fatty acid profile of used cooking oil

Fatty acid (derived as methyl ester)	%wt. (by %peak area)
Lauric acid (C12:0)	0.15
Myristoleic acid (C14:0)	0.66
Palmitic acid (C16:0)	32.13
Palmitoleic acid (C16:1)	1.81
Stearic acid (C18:0)	0.04
Oleic acid (C18:1)	23.30
Linoleic acid (C18:2)	39.42
Linolenic acid(C18:3)	1.32
Arachidonic acid(C20:4)	0.10
Eicosadienoic acid(C20:2)	0.04
Eicosapentaenoic acid (C20:5)	0.29
Erucic acid (C22:1)	0.04
Unknown	0.70

Table S2. ANOVA test result on the FA yield with respect to the catalytic system, gas type, temperature, added pressure, and their interactions

Source	Degree of Freedom	Adjusted SS	Adjusted MS	F-value	*p*-value
System	2	34771.4	17385.7	8735.19	0.000
Gas	1	226.6	226.6	113.85	0.000
Temperature	2	7641.8	3820.9	1919.76	0.000
Added Pressure	3	215.3	71.8	36.06	0.000
System × Gas	2	28.9	14.5	7.26	0.002
System × Temperature	4	2591.3	647.8	325.50	0.000
System × Added Pressure	6	102.0	17.0	8.54	0.000
Gas × Temperature	2	27.0	13.5	6.77	0.003
Gas × Added Pressure	3	113.6	37.9	19.02	0.000
Temperature × Added Pressure	6	13.2	2.2	1.11	0.374
Error	40	79.6	2.0		
Total	71	45810.8			

Model Summary	S	R^2	R^2 (adjusted)	R^2 (predicted)
	1.41078	0.9983	0.9969	0.9944

Table S3. ANOVA test results of the effect of gas type, temperature, added pressure, and their interactions on the Cu removal percentage

Source	Degree of Freedom	Adjusted SS	Adjusted MS	F-value	*p*-value
Gas	1	1100.0	1100.02	52.86	0.001
Temperature	2	1294.1	647.07	31.09	0.001
Added Pressure	3	1554.5	518.18	24.09	0.001
Gas × Temperature	2	136.4	68.21	3.28	0.109
Gas × Added Pressure	3	644.7	214.89	10.33	0.009
Temperature × Added Pressure	6	312.0	52.00	2.50	0.145
Error	6	124.9	20.81		
Total	23	5166.7			

Model Summary	S	R^2	R^2 (adjusted)	R^2 (predicted)
	4.56185	0.9758	0.9074	0.6133

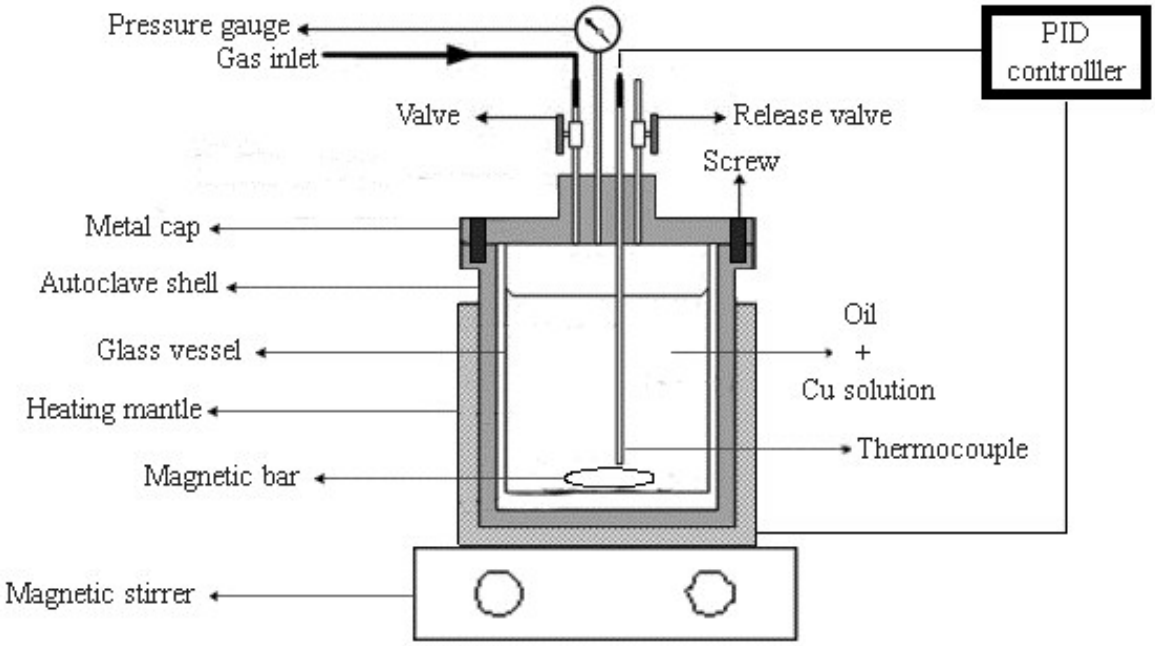

Figure S1. Schematic figure of batch subcritical water reactor apparatus

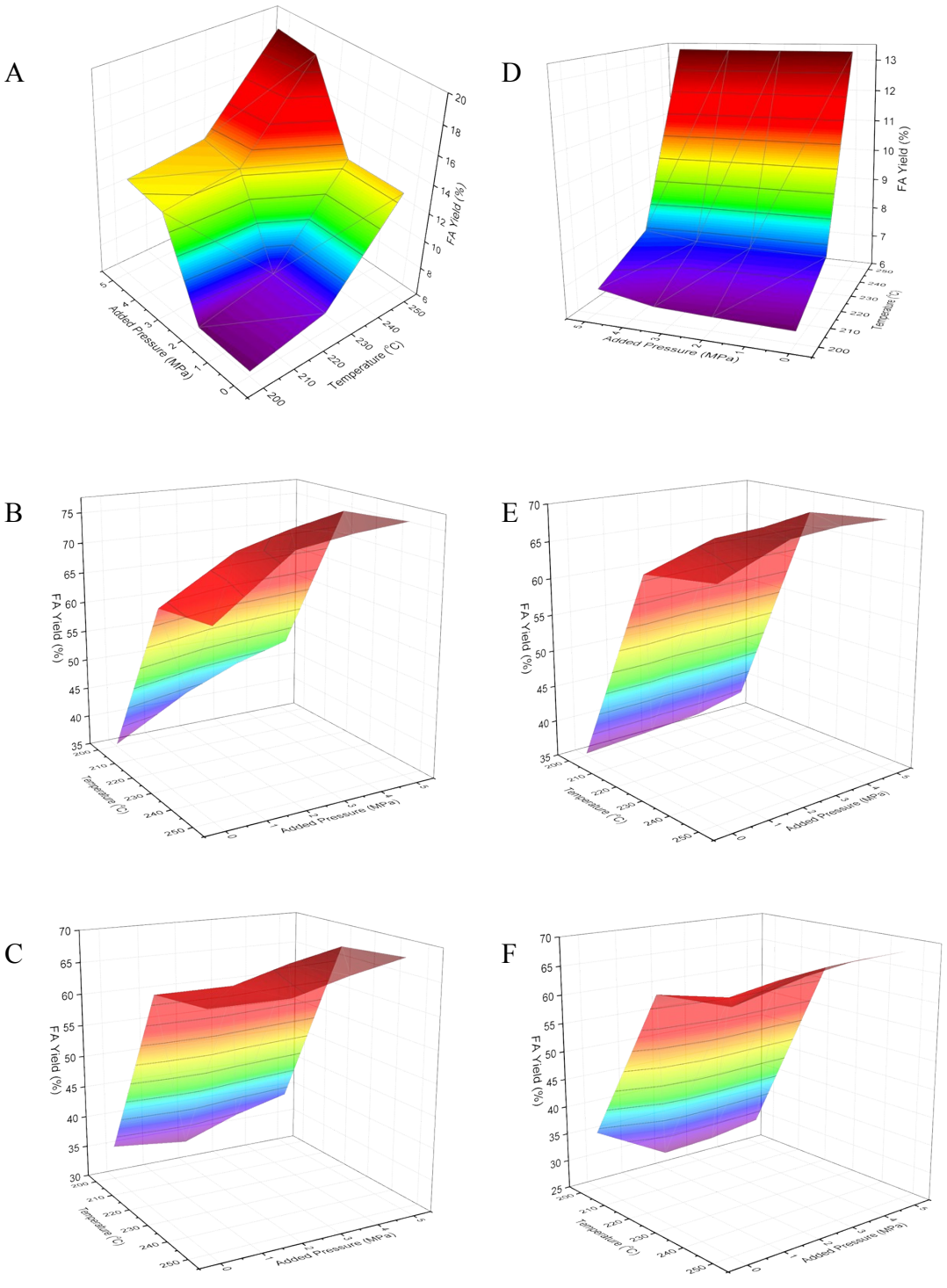

Figure S2. Surface plots of temperature-added pressure-FA yield in FA autocatalyzed system, Cu-catalyzed system, and acid catalyzed system using N_2 (A-C) and CO_2 (D-F)

Figure S3. Soluble CO_2 showed as bubbles on the top of oil layer

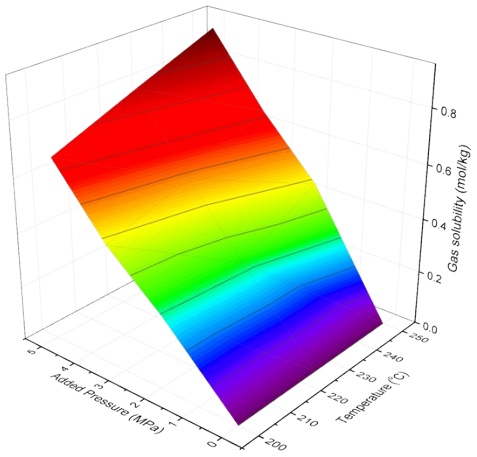

Figure S4. CO_2 solubility in the water at studied temperature and added pressure (values were calculated based on the actual pressure)

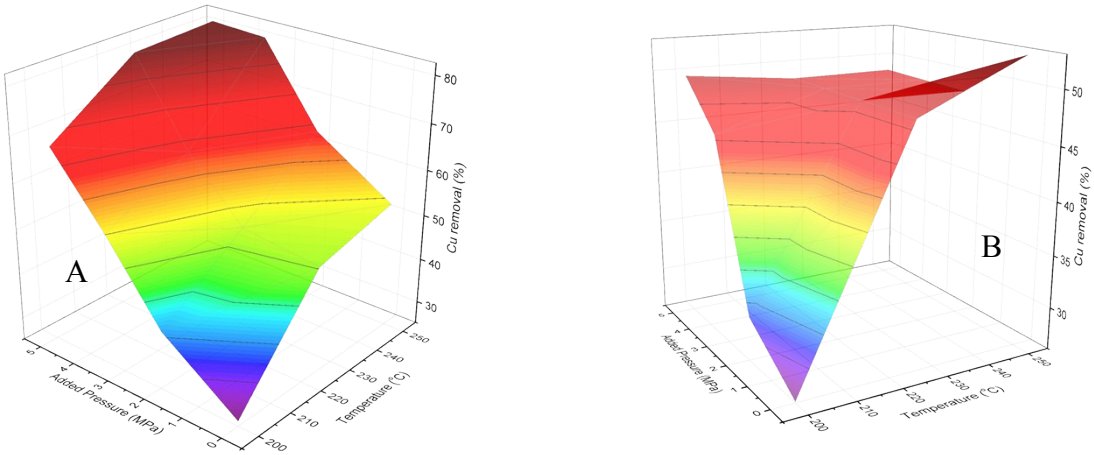

Figure S5. Three dimensional plot of temperature-added pressure-Cu removal percentage using (A) N_2 and (B) CO_2

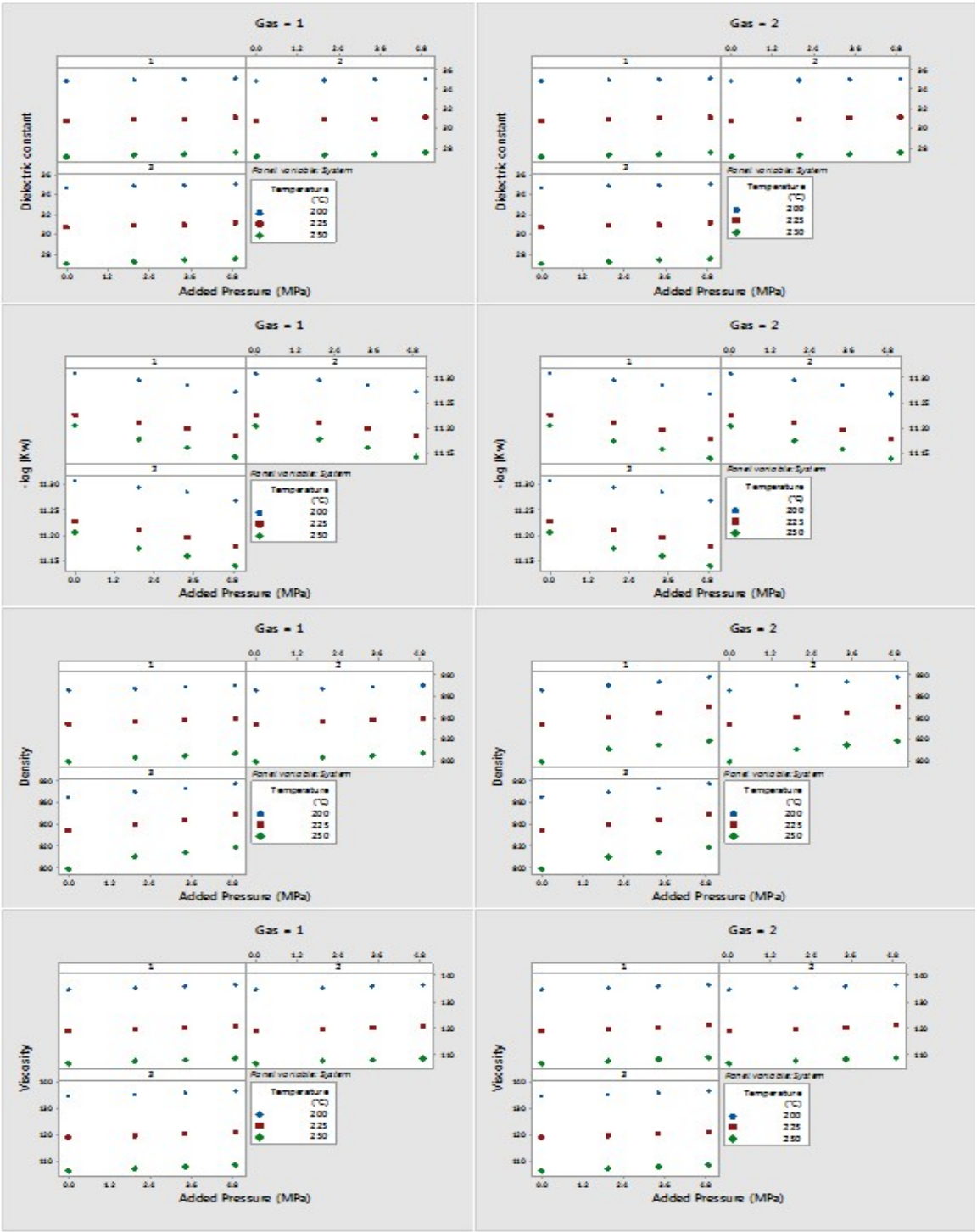

Figure S6. Subcritical water properties in FA autocatalytic system (system 1), Cu-catalyzed system (system 2), and acid-catalyzed system (system 3) at various temperatures and additional pressures using N_2 (gas 1) and CO_2 (gas 2)