

Supplementary material

Supplemental Table 1. Ten thin-layer drying models used for experimental data fitting.

NO.	Model name	Model	Reference
1	Page	$MR = \text{Exp}(-kt^n)$	Rodriguez, & Cleland, 1988 [33]
2	Lewis	$MR = \text{Exp}(-kt)$	Midilli, Kucuk, & Yapar, 2002 [34]
3	Henderson & Pabis	$MR = a \text{Exp}(-kt)$	Xanthopoulos et al., 2007 [35]
4	Modified page	$MR = \text{Exp}(-kt)^n$	Midilli, Kucuk, & Yapar, 2002 [34]
5	Wang & Singh	$MR = 1 + at + bt^2$	Midilli, Kucuk, & Yapar, 2002 [34]
6	Approximation of diffusion	$MR = a \text{Exp}(-kt) + (1-a) \text{Exp}(-kat)$	Contini, Martelli, & Zaccanti, 1997 [36]
7	Logarithmic	$MR = a \text{Exp}(-kt) + c$	Midilli, Kucuk, & Yapar, 2002 [34]
8	Simplified Fick's diffusion	$MR = a \text{Exp}(-c(t/l^2))$	Midilli, Kucuk, & Yapar, 2002 [34]
9	Modified Page equation-II	$MR = \text{Exp}(-c(t/l^2)^n)$	Wang et al., 2007 [37]
10	Two-term model	$MR = a \text{Exp}(-k_0t) + b \text{Exp}(-k_1t)$	Mohapatra, & Rao, 2005 [38]

Supplemental Table 2. Statistical analyses of modelling of the moisture ratio and drying time during MVD.

Drying condition		Page	Lewis	Modified page	Wang & Singh	Logarithmic
0.3 kW	R^2	0.9930	0.9271	0.9180	0.9866	0.9950
	$RMSE$	0.0057	0.0672	0.0672	0.0110	0.0036
	χ^2	7.16E-4	0.0075	0.0084	0.0014	5.14E-4
0.5 kW	R^2	0.9912	0.9367	0.9276	0.9799	0.9872
	$RMSE$	0.0055	0.0450	0.0450	0.0125	0.0068
	χ^2	7.82E-4	0.0056	0.0064	0.0018	0.0011
1.0 kW	R^2	0.9927	0.9303	0.9203	0.9772	0.9858
	$RMSE$	0.0050	0.0552	0.0552	0.0158	0.0084
	χ^2	7.19E-4	0.0069	0.0079	0.0023	0.0014
1.5 kW	R^2	0.9944	0.9486	0.9428	0.9816	0.9916
	$RMSE$	0.0041	0.0426	0.0426	0.0137	0.0056
	χ^2	4.60E-4	0.0043	0.0047	0.0015	6.94E-4
2.0 kW	R^2	0.9928	0.9179	0.9042	0.9738	0.9873
	$RMSE$	0.0036	0.0478	0.0478	0.0131	0.0053
	χ^2	6.01E-4	0.0068	0.0080	0.0022	0.0011

Henderson & Pabis	Approximation of diffusion	Simplified Fick's diffusion	Modified Page equation-II	Two-term Model
0.9563	0.9180	0.9501	0.9920	0.9418
0.0358	0.0672	0.0358	0.0057	0.0358
0.0045	0.0084	0.0051	8.17E-4	0.0060
0.9615	0.9276	0.9551	0.9897	0.9461
0.0239	0.0450	0.0239	0.0055	0.0239
0.0034	0.0064	0.0040	9.12E-4	0.0048
0.9573	0.9203	0.9502	0.9915	0.9402
0.0296	0.0553	0.0296	0.0050	0.0296
0.0042	0.0079	0.0049	8.39E-4	0.0059
0.9760	0.9956	0.9730	0.9937	0.9691
0.0179	0.0033	0.0179	0.0041	0.0179
0.0020	3.65E-4	0.0022	5.18E-4	0.0026
0.9548	0.7588	0.9458	0.9913	0.9323
0.0226	0.1204	0.0226	0.0036	0.0226
0.0038	0.0201	0.0045	7.21E-4	0.0056

Undertake the above Table.

Supplemental Table 3. Peak area ratios for the three states of water.

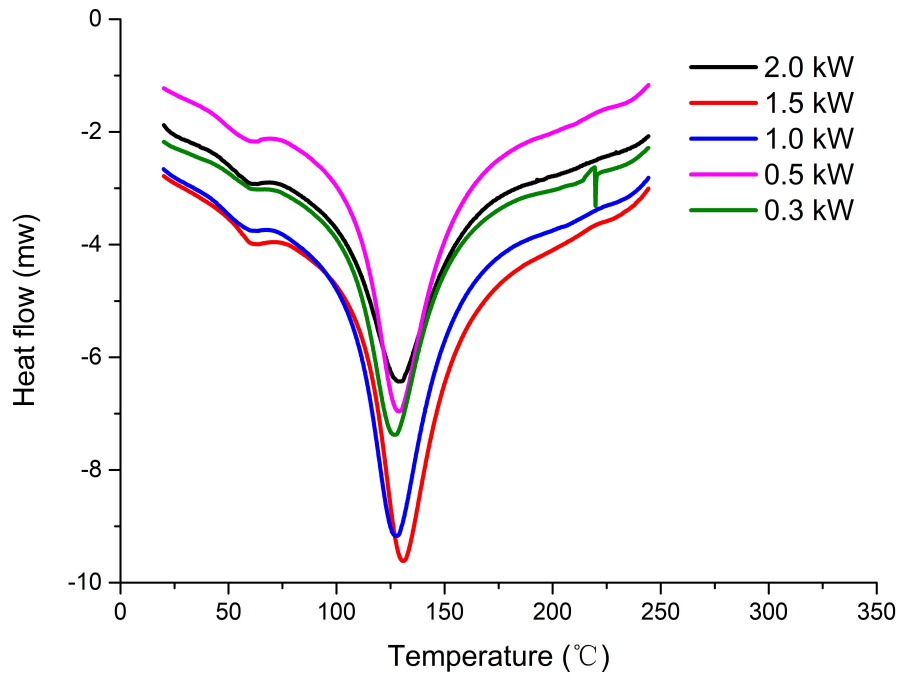
Microwave power (kW)	Drying time (min)	A ₂₁ (%)	A ₂₂ (%)	A ₂₃ (%)
0.3 kW	0	0.210	0.698	0.092
	56.0	0.251	0.702	0.047
	112.0	0.974	0.000	0.026
	168.0	0.930	0.000	0.070
	224.0	0.760	0.113	0.127
	280.0	0.655	0.340	0.005
0.5 kW	32.0	0.000	0.935	0.065
	64.0	0.933	0.000	0.067
	96.0	0.813	0.123	0.063
	128.0	0.805	0.115	0.080
	160.0	0.826	0.000	0.174
1.0 kW	15.0	0.000	0.938	0.062
	30.0	0.978	0.000	0.022
	45.0	0.845	0.093	0.062
	60.0	0.832	0.116	0.052
	75.0	0.776	0.125	0.100
1.5 kW	10.0	0.000	0.907	0.093
	20.0	0.956	0.000	0.044
	30.0	0.871	0.110	0.019
	40.0	0.833	0.129	0.038
	50.0	0.709	0.237	0.054
2.0 kW	7.0	0.017	0.925	0.058
	14.0	0.974	0.000	0.026
	21.0	0.866	0.093	0.041
	28.0	0.855	0.084	0.060
	36.0	0.797	0.102	0.101

Supplemental Table 4. The Person correlation coefficients for different chemical properties of microwave-dried coffee beans.

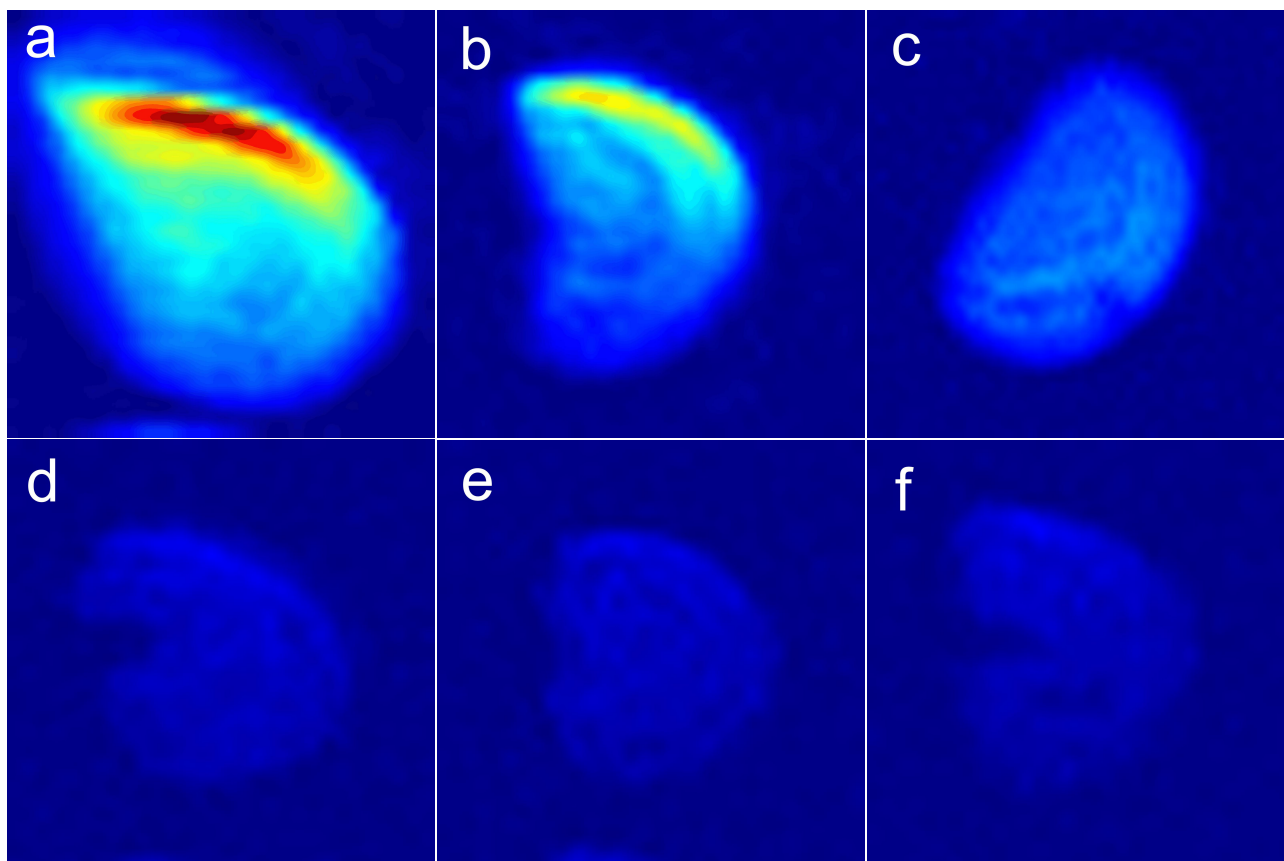
	TPC	DPPH	FRAP	ABTS
TPC	1.000			
DPPH	0.660**	1.000		
FRAP	0.916**	0.706**	1.000	
ABTS	0.180	0.070	0.249	1.000

** $p < 0.01$.

Supplemental Figure 1. DSC spectra of coffee beans dried at five different microwave power settings.



Supplemental Figure 2. NMR imaging of samples at six stages of the drying process at 1.0-kW microwave power: (a) 0 min; (b) 15.0 min; (c) 30.0 min; (d) 45.0 min; (e) 60.0 min; and (f) 75.0 min.



Supplemental Figure 3. Infrared thermal imaging of samples at eight stages of the drying process at 1.0 kW microwave power: (a) 0 min; (b) 10.0 min; (c) 20.0 min; (d) 30.0 min; (e) 40.0 min; (f) 50.0 min; (g) 60.0 min; and (h) 75.0 min.

