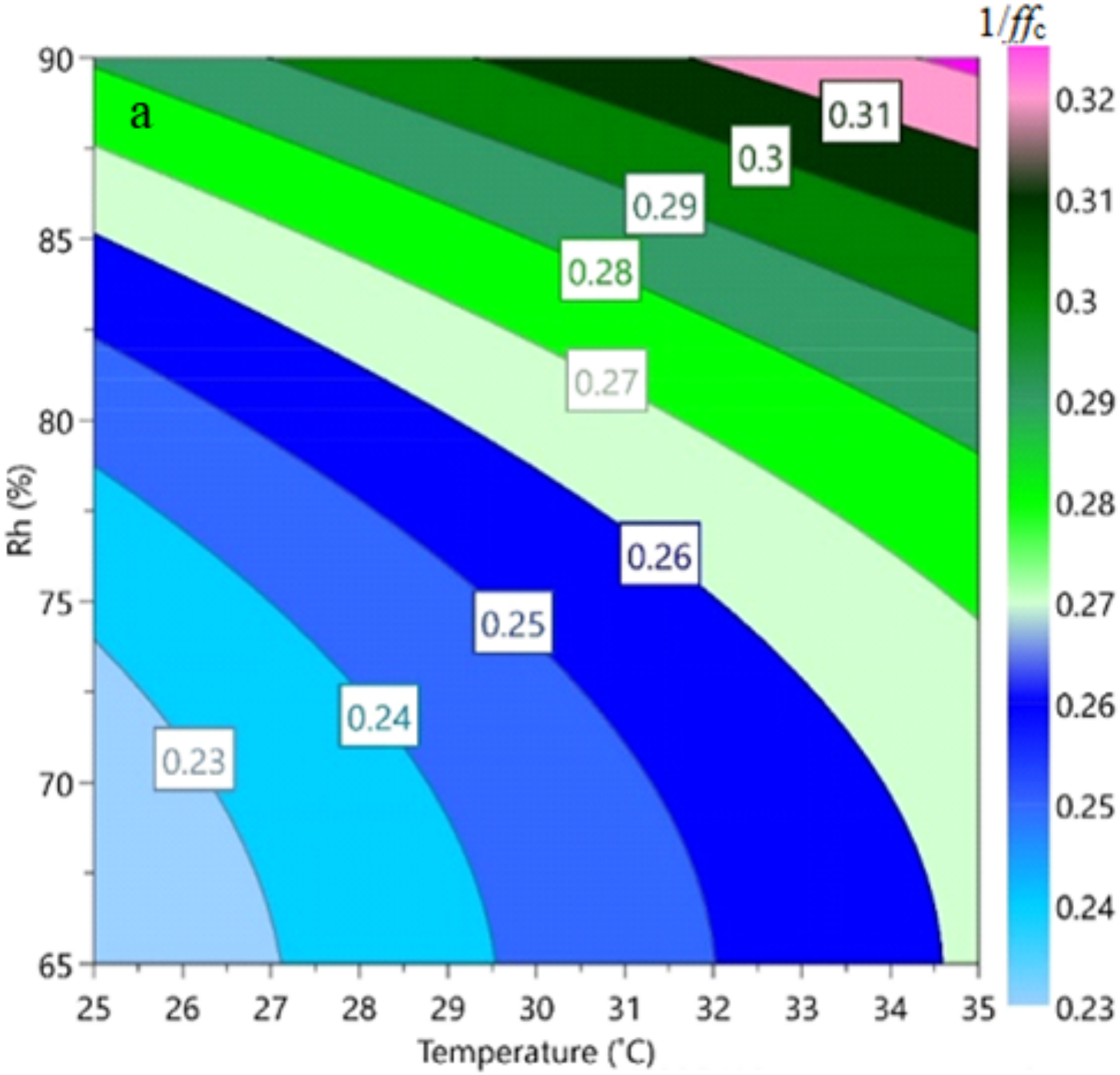
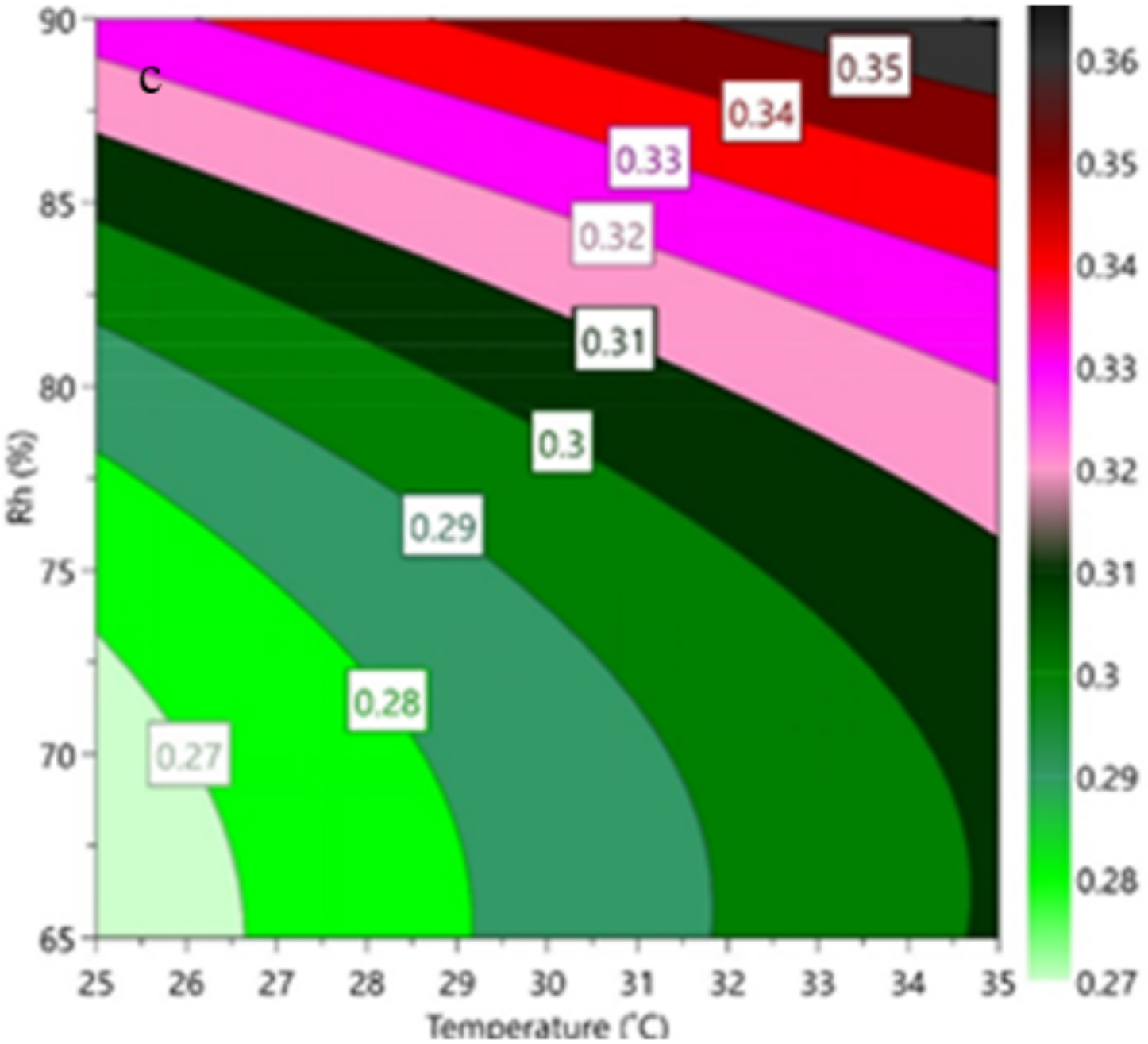
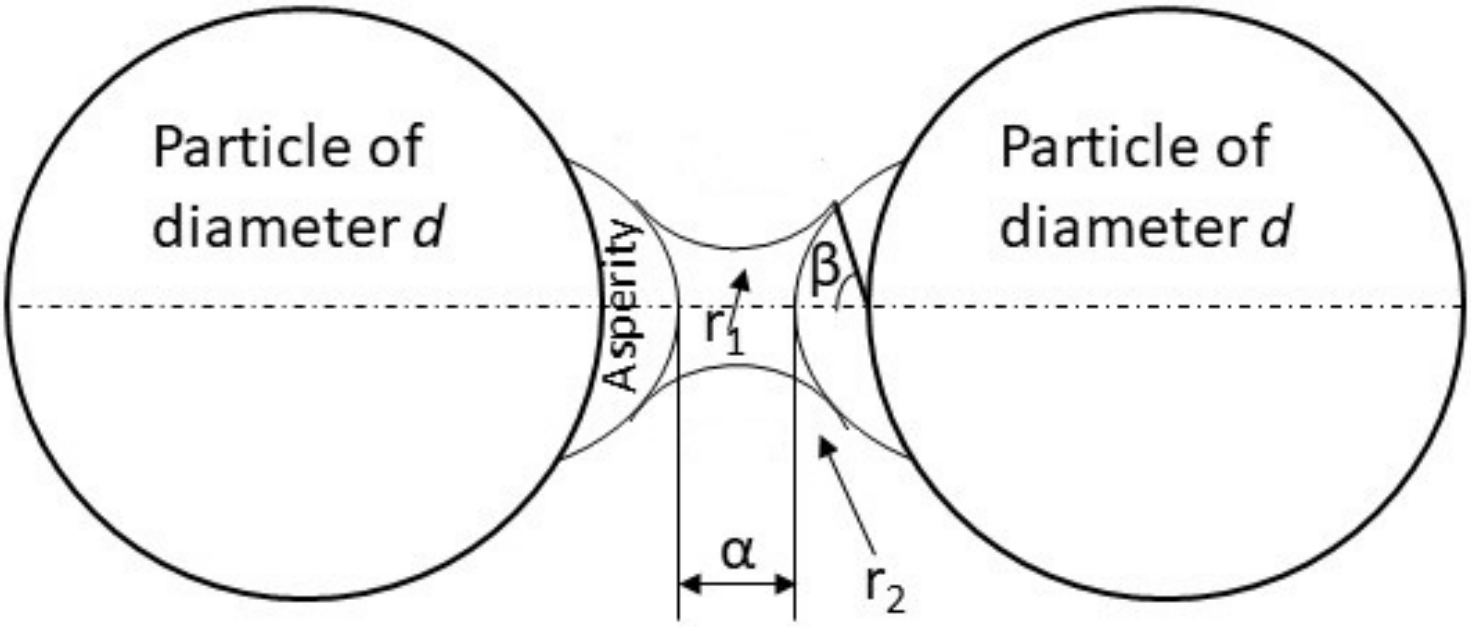
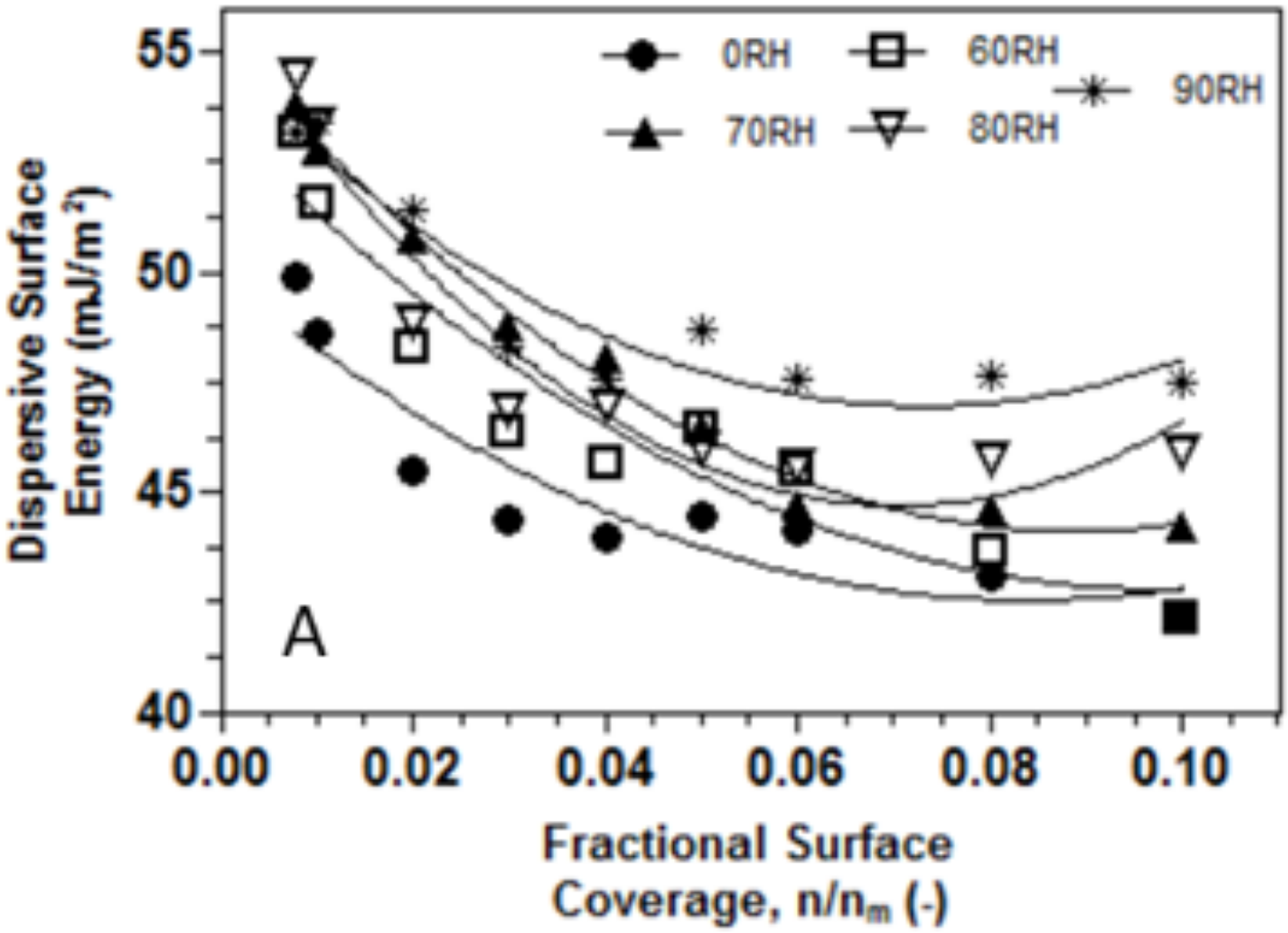
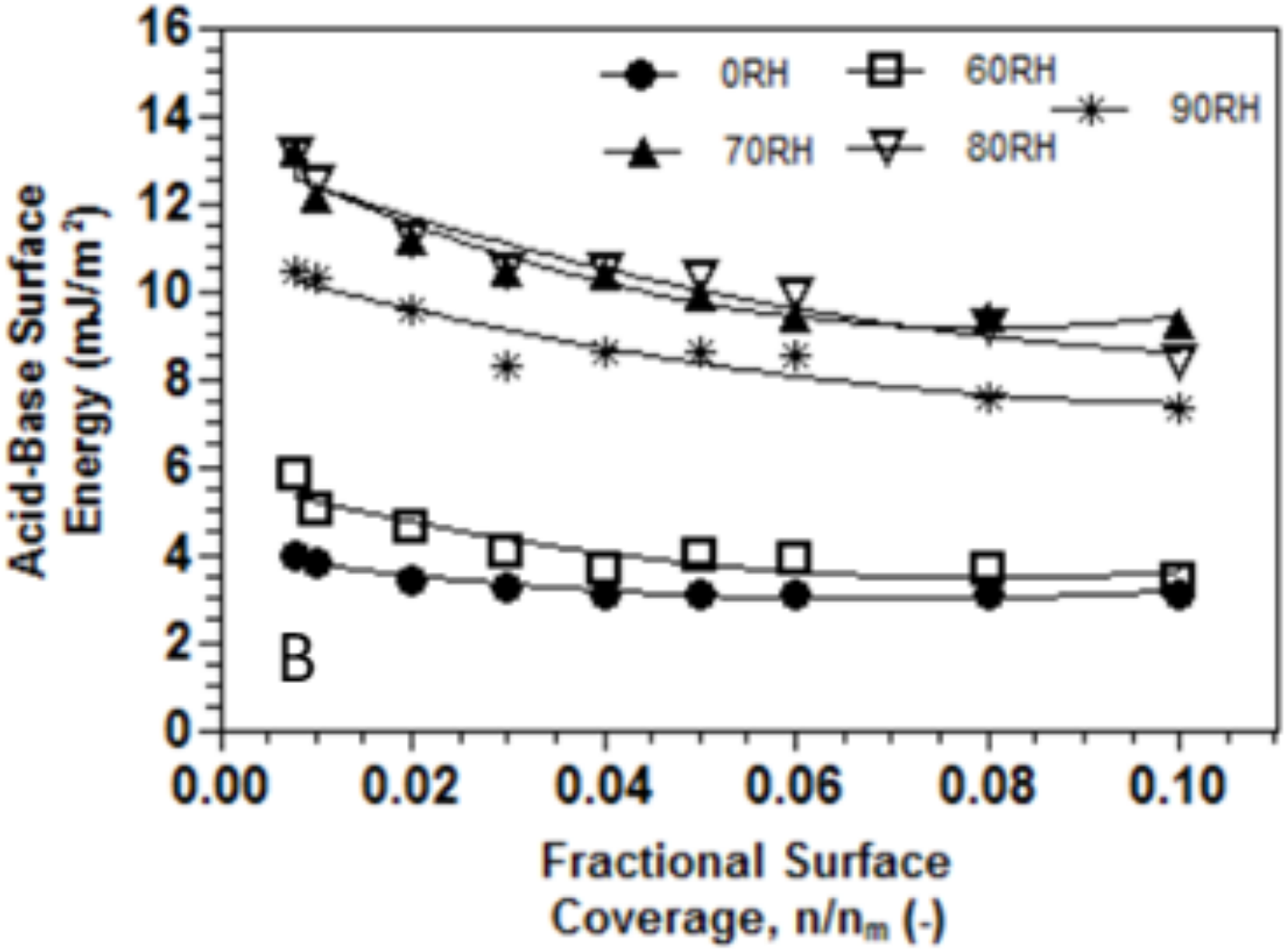
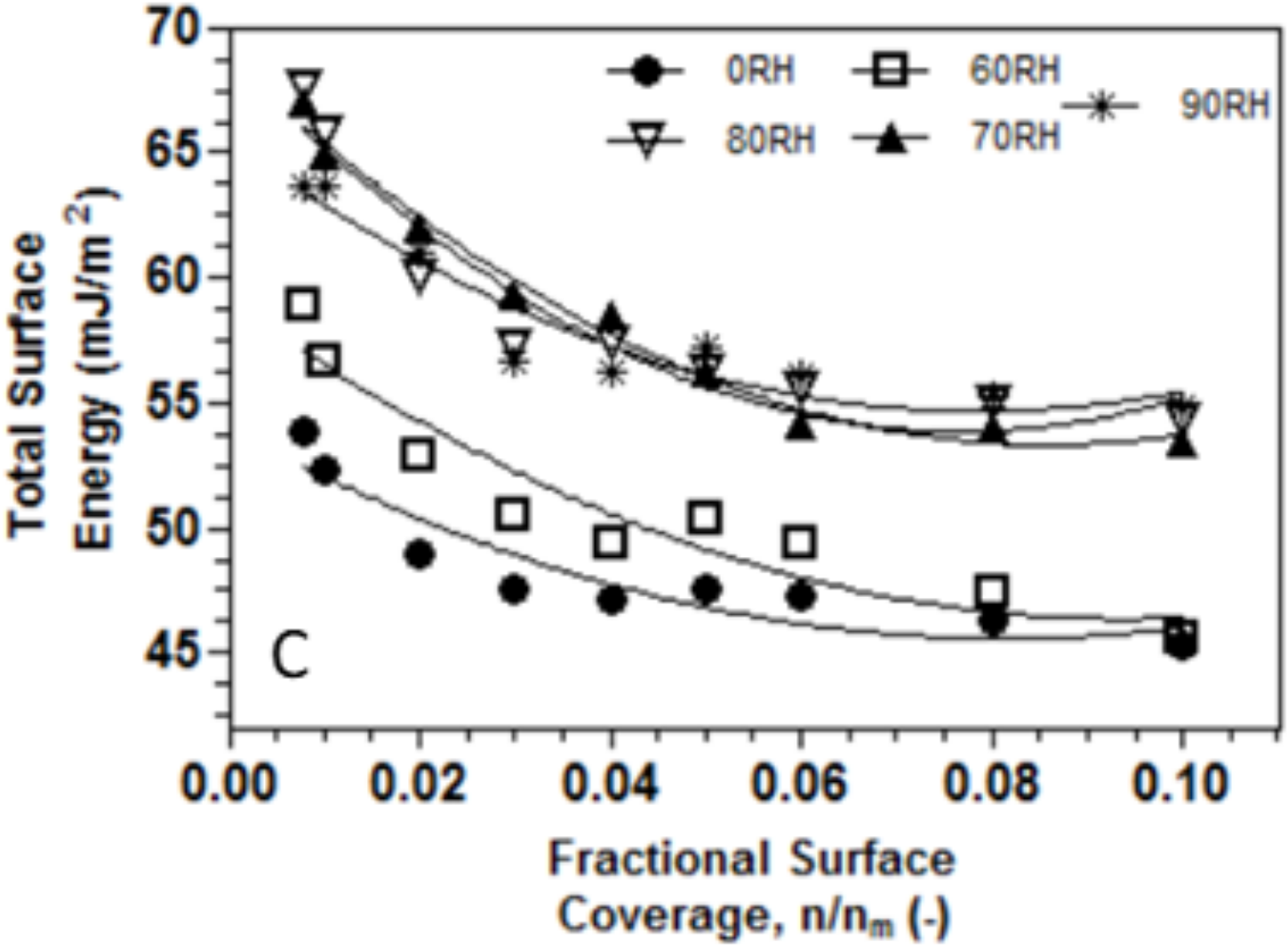

a
1/ffc
0.32
0.31
0.3
0.29
0.28
0.27
0.26
0.25
0.24
0.23
90
85
80
75
70
65
Rh (%)
25
26
27
28
29
30
31
32
33
34
35
Temperature (°C)

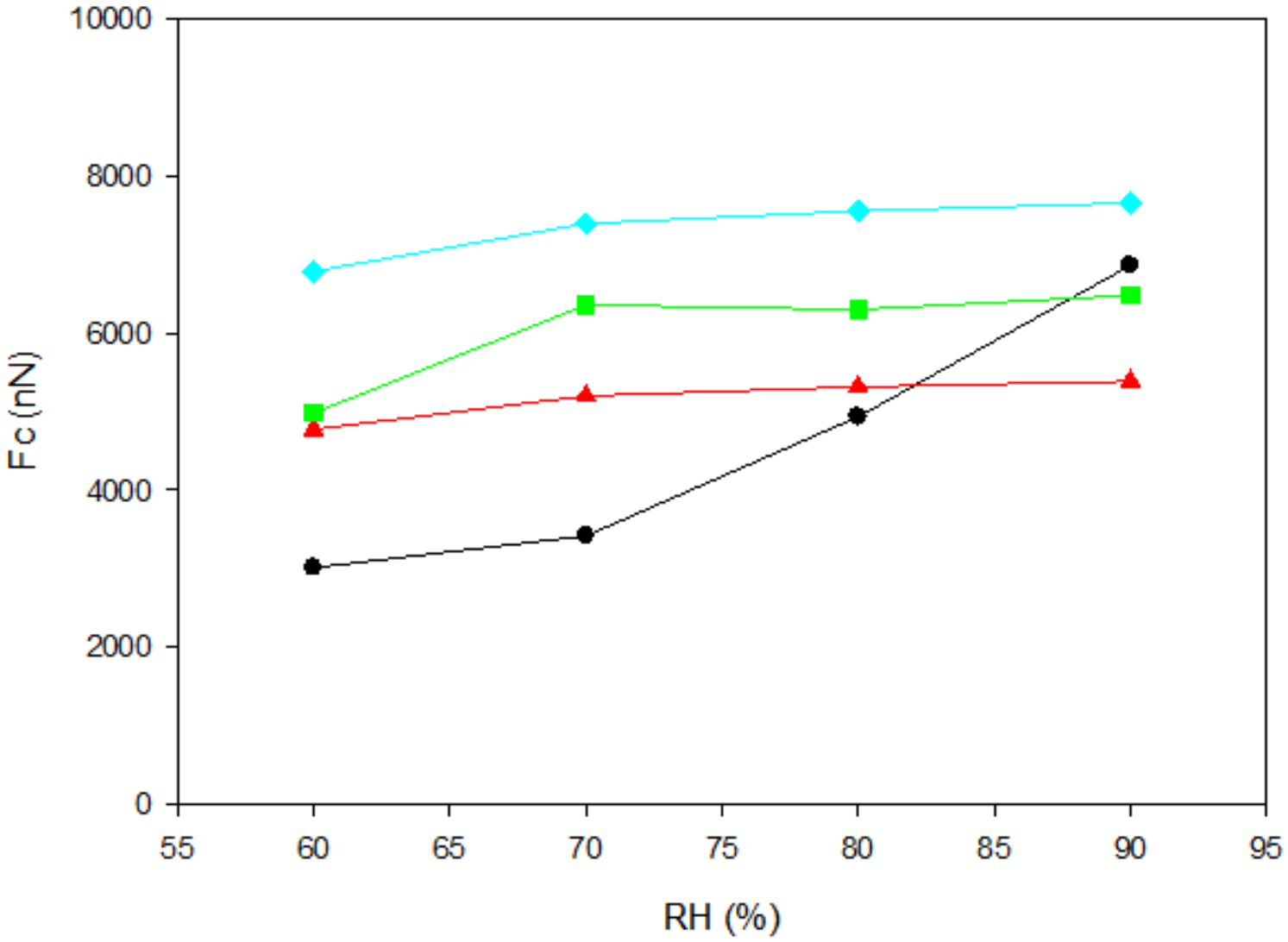

C
0.35
0.34
0.33
0.32
0.31
0.3
0.29
0.28
0.27
90
85
80
75
70
65
Rh (%)
25
26
27
28
29
30
31
32
33
34
35
Temperature (°C)
0.36
0.35
0.34
0.33
0.32
0.31
0.3
0.29
0.28
0.27

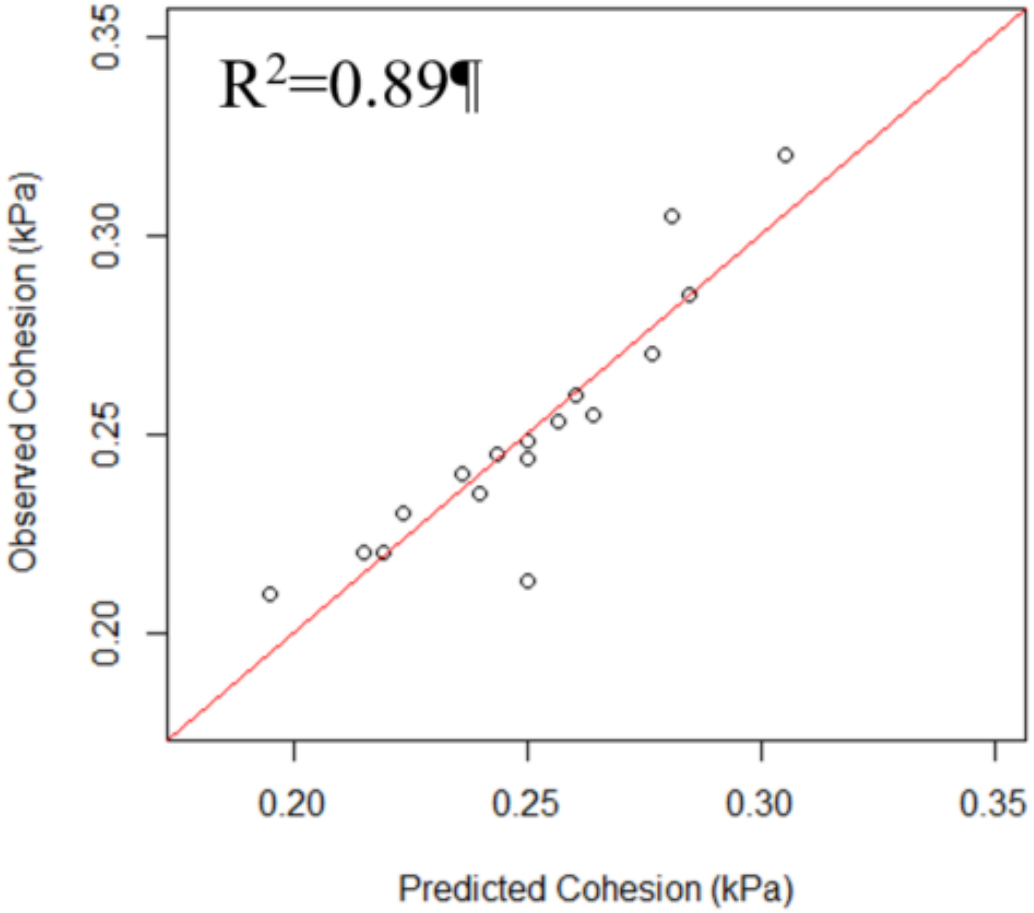

Particle of diameter *d*
Asperity
β
r_1
α
r_2
Particle of diameter *d*

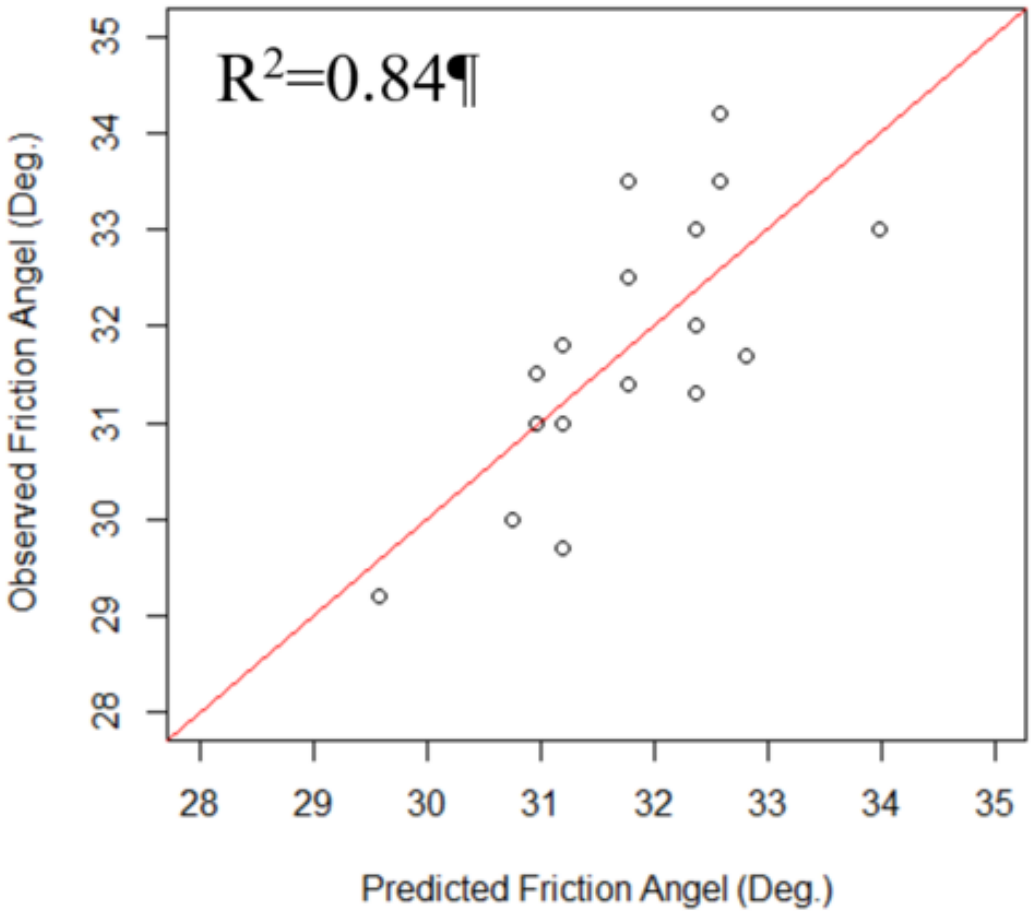

0RH
60RH
90RH
70RH
80RH
55
50
45
40
0.00
0.02
0.04
0.06
0.08
0.10
A
Dispersive Surface Energy (mJ/m²)
Fractional Surface Coverage, n/nm (-)

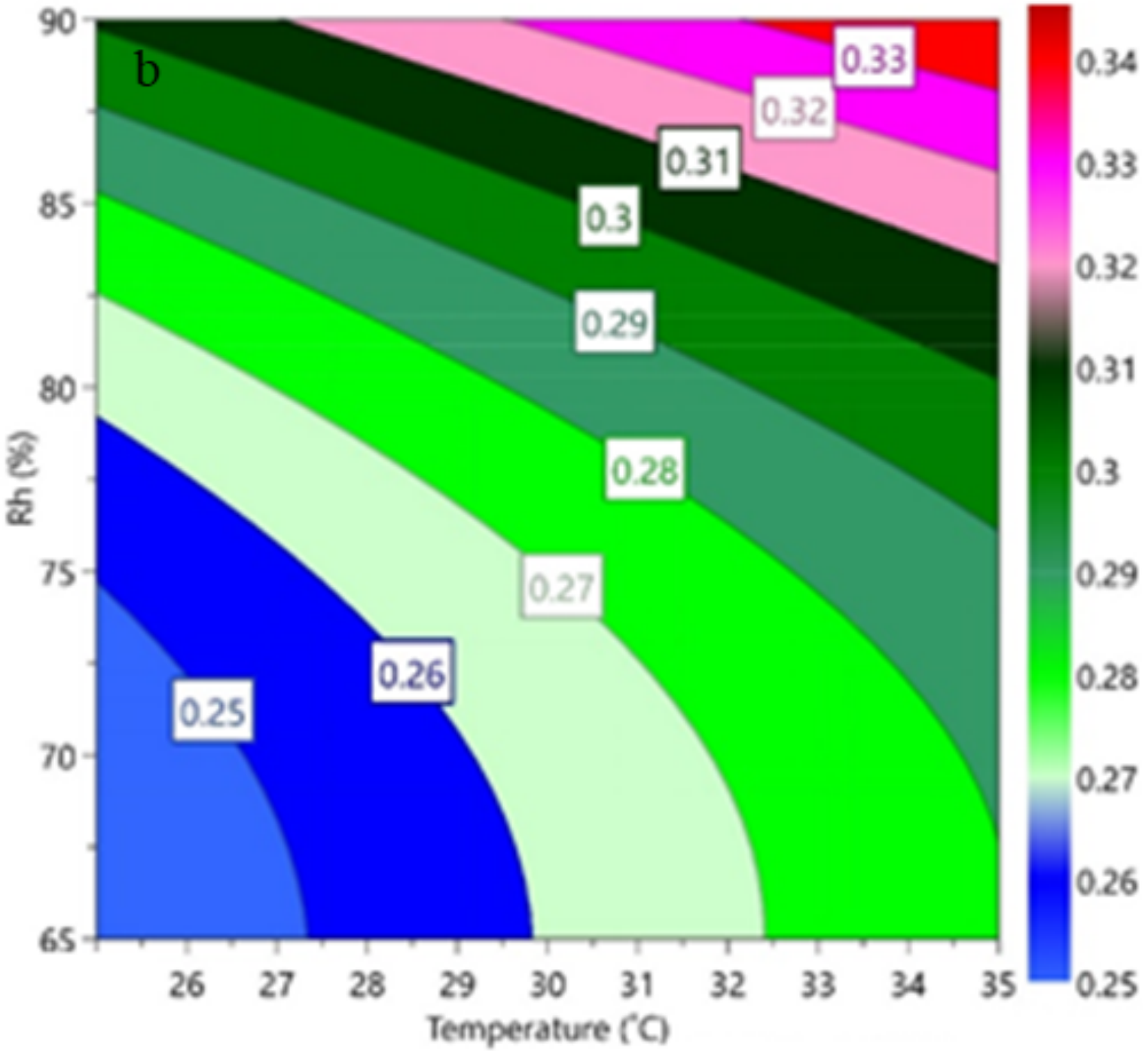

0RH
60RH
90RH
70RH
80RH
B
Acid-Base Surface Energy (mJ/m²)
Fractional Surface Coverage, n/nm (-)
0
2
4
6
8
10
12
14
16
0.00
0.02
0.04
0.06
0.08
0.10

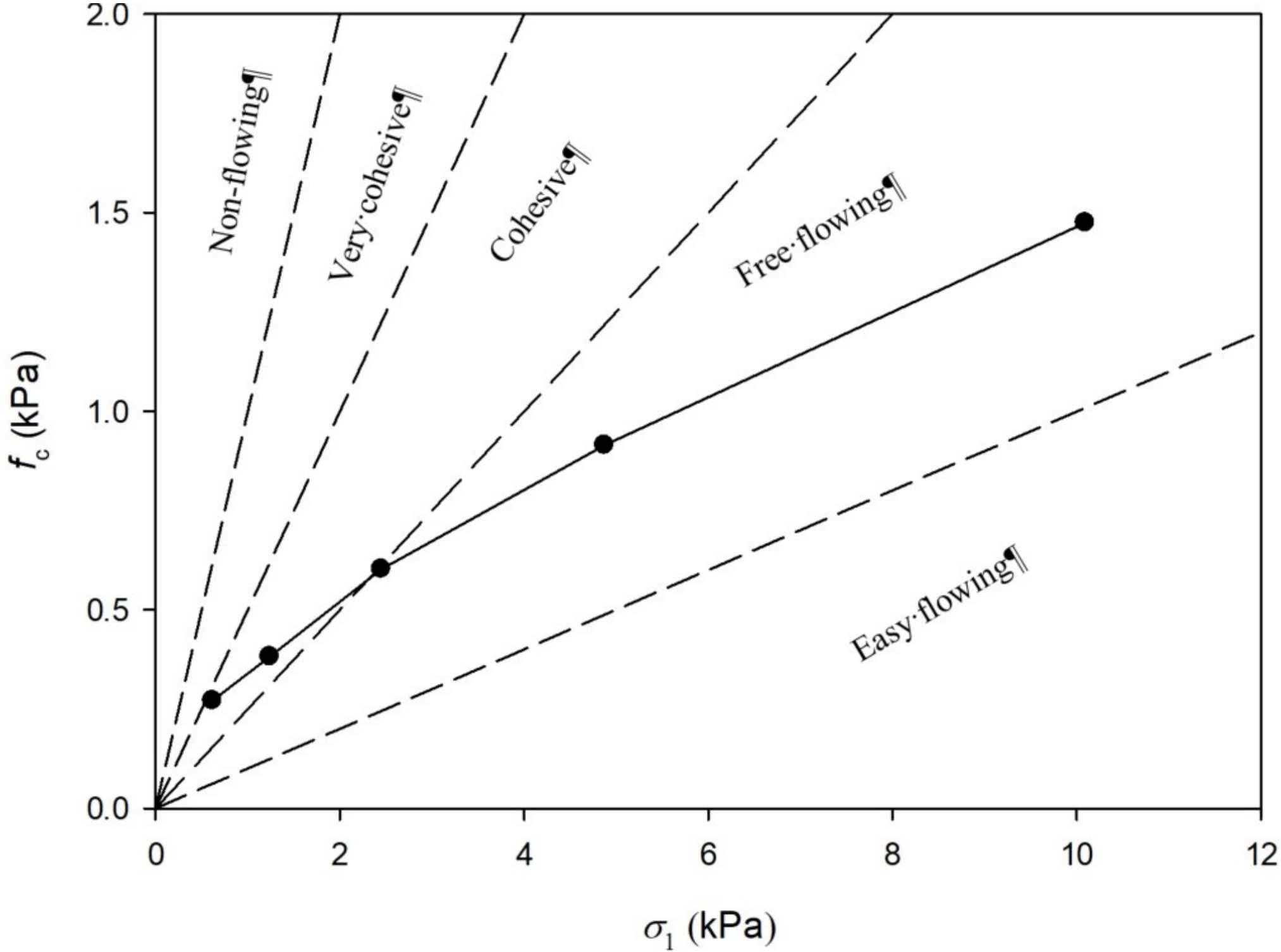

70
65
60
55
50
45
0RH
60RH
90RH
80RH
70RH
C
Total Surface Energy (mJ/m^2)
0.00
0.02
0.04
0.06
0.08
0.10
Fractional Surface Coverage, n/n$_m$ (-)


10000
8000
6000
4000
2000
0
Fc (nN)
55
60
65
70
75
80
85
90
95
RH (%)


R2=0.89¶
Observed Cohesion (kPa)
Predicted Cohesion (kPa)
0.20
0.25
0.30
0.35


R2=0.84¶
Observed Friction Angel (Deg.)
Predicted Friction Angel (Deg.)
28
29
30
31
32
33
34
35


b
90
85
80
75
70
65
Rh (%)
26
27
28
29
30
31
32
33
34
35
Temperature (°C)
0.33
0.32
0.31
0.3
0.29
0.28
0.27
0.26
0.25
0.34
0.33
0.32
0.31
0.3
0.29
0.28
0.27
0.26
0.25


Non-flowing¶
Very·cohesive¶
Cohesive¶
Free·flowing¶
Easy·flowing¶
f_c (kPa)
σ_1 (kPa)
0.0
0.5
1.0
1.5
2.0
0
2
4
6
8
10
12