Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

IN SITU INVESTIGATION OF MESOPOROUS SILICON OXIDATION KINETICS USING INFRARED EMITTANCE SPECTROSCOPY

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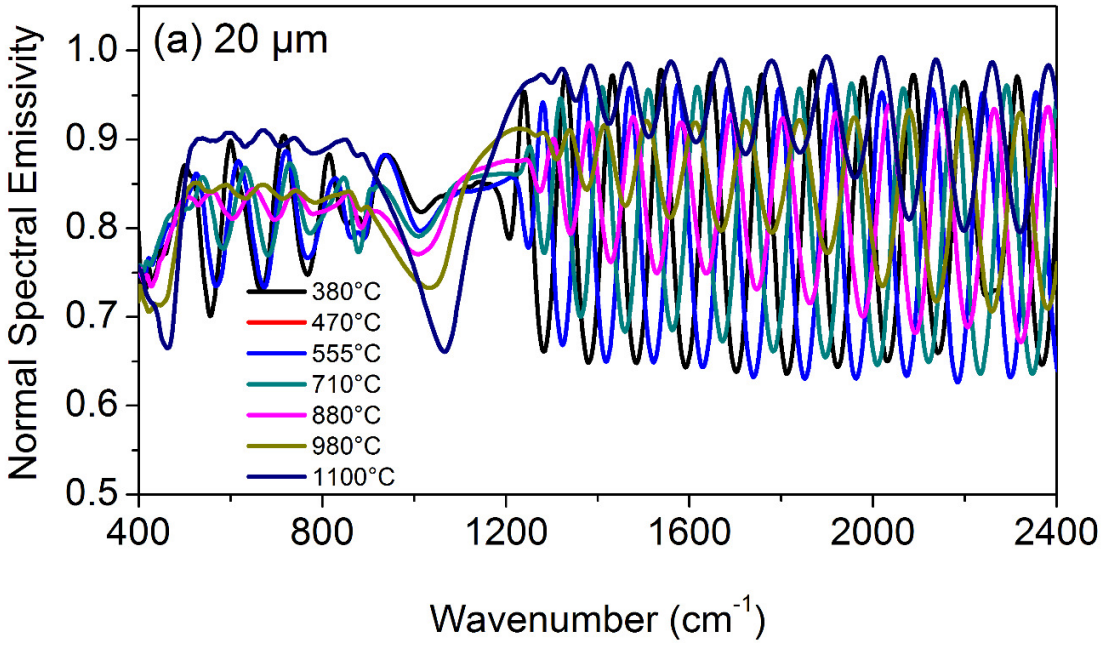
Supporting information

The three samples were synthesized following the same experimental protocol except for the current density and the etching duration. The anodization of the 20 µm-thick sample (porosity 45%) was performed at 80 mA/cm² for 4.5 minutes whereas the 50 µm-thick one (porosity 40%) was obtained with a current density of 50 mA/cm² for 15 min.



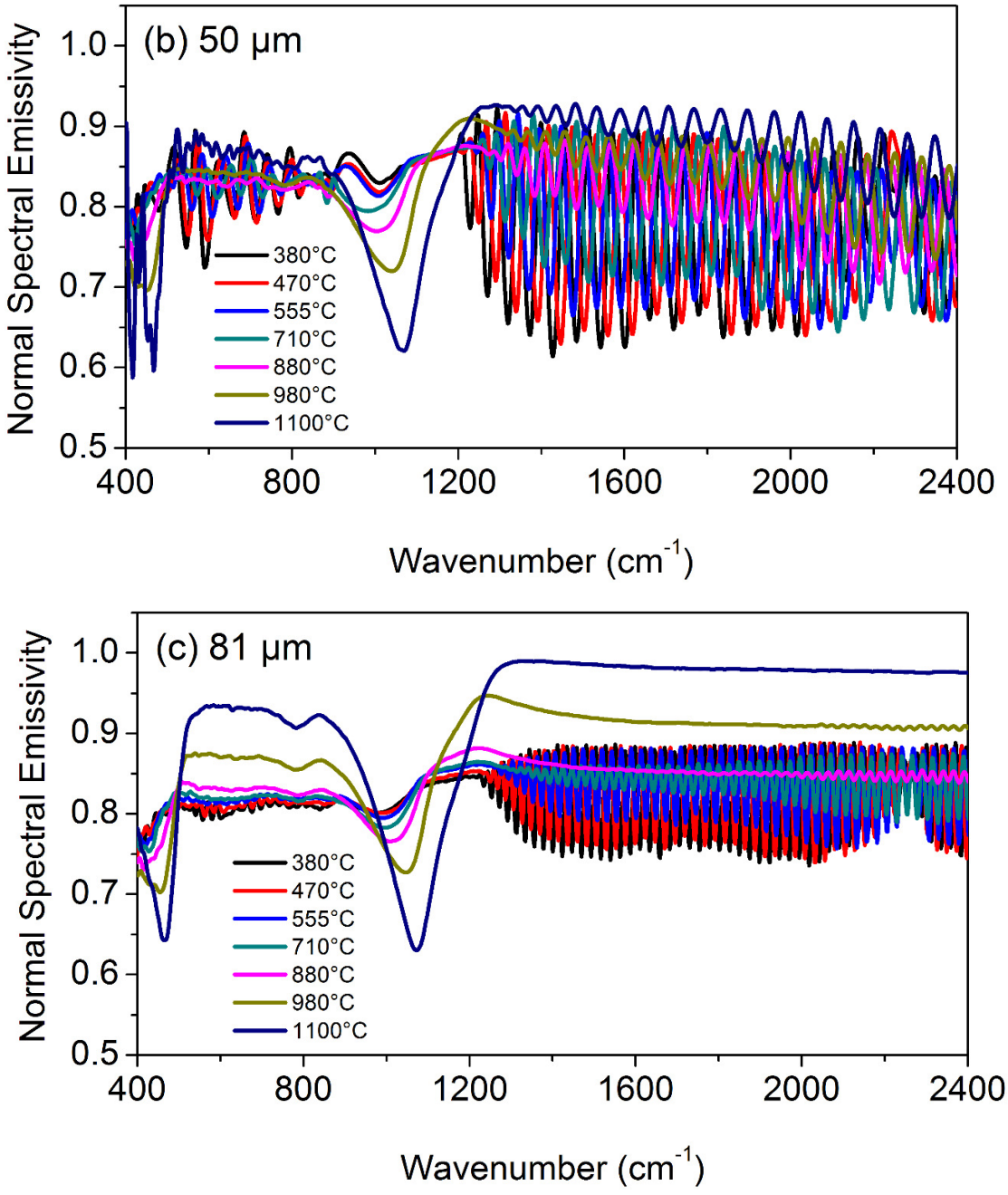
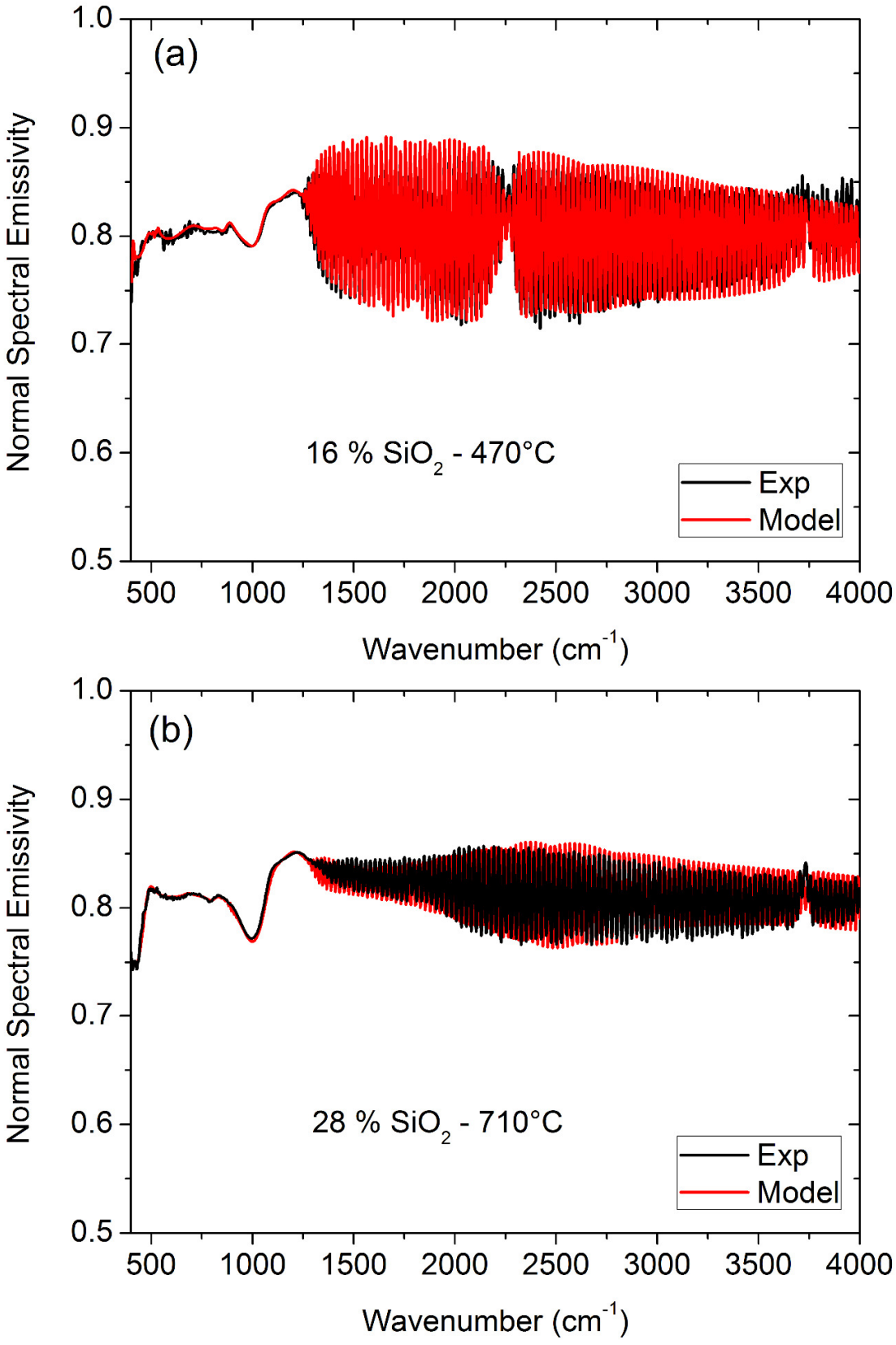


Figure S1-Evolution of normal spectral emissivity of 3 PS samples with thicknesses of 20 µm (a), 50 µm(b) and 81 µm (c) from 380°C to 1100°C. The respective porosity of these samples is 45% (20 µm), 40% (50 µm) and 30% (81 µm).


(a)
Normal Spectral Emissivity
1.0
0.9
0.8
0.7
0.6
0.5
16 % SiO2 - 470°C
Exp
Model
500
1000
1500
2000
2500
3000
3500
4000
Wavenumber (cm-1)
(b)
Normal Spectral Emissivity
1.0
0.9
0.8
0.7
0.6
0.5
28 % SiO2 - 710°C
Exp
Model
500
1000
1500
2000
2500
3000
3500
4000
Wavenumber (cm-1)

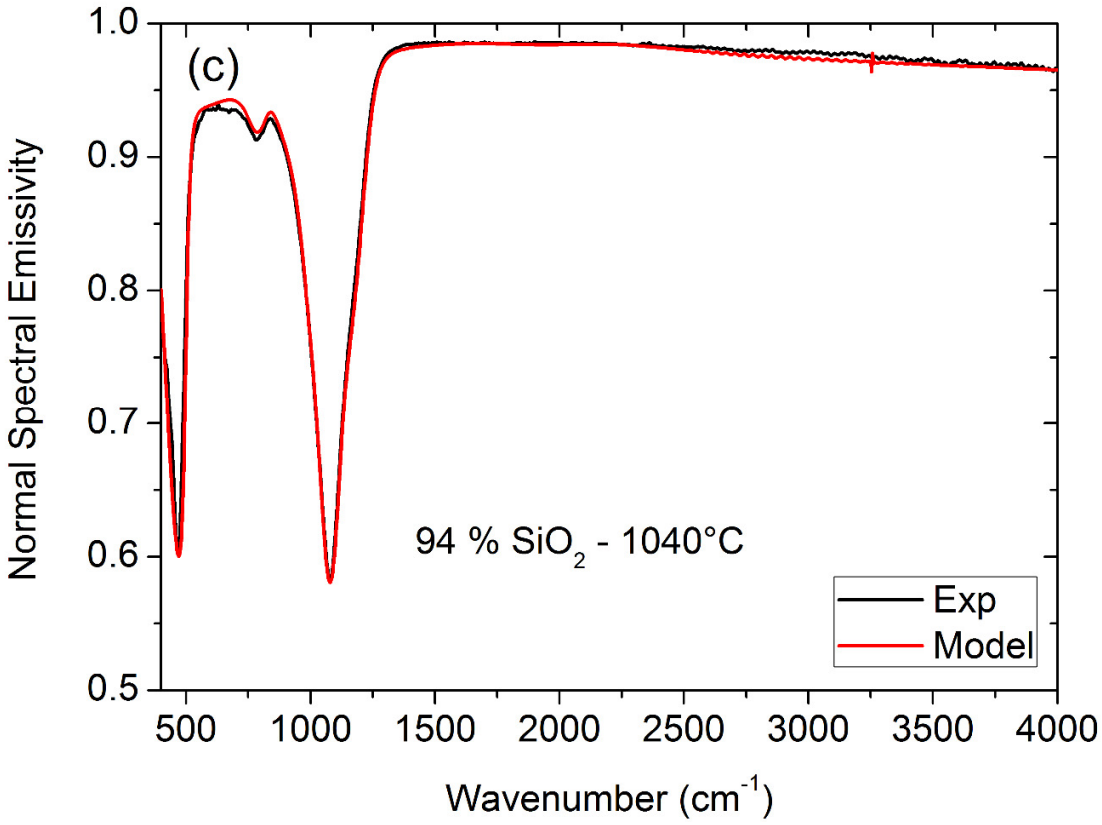


Figure S2-Typical evolution of the normal spectral emissivity showing the good correlation between experimental data (black) and fit (red) at three distinct temperatures: 470°C, 710°C and 1040°C

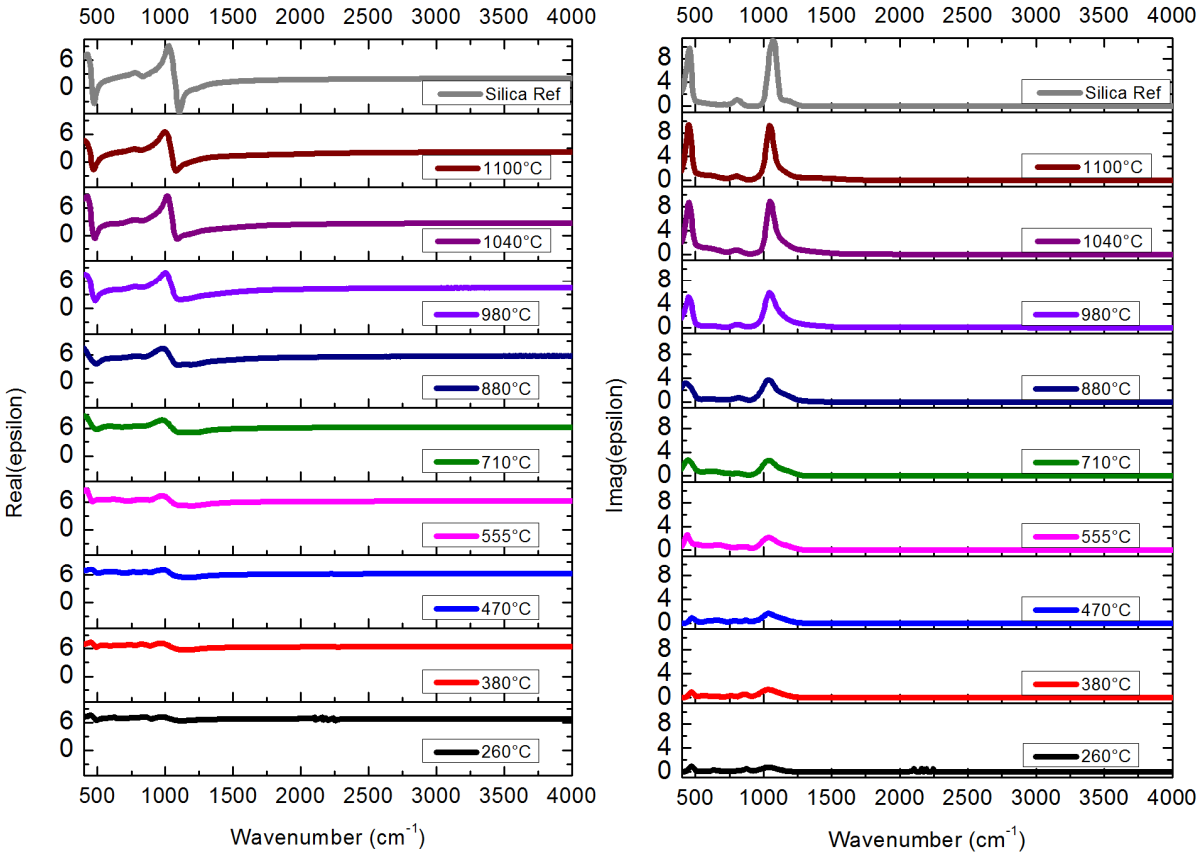


Figure S3-Evolution of the complex dielectric function (real part and imaginary part) of the effective medium extracted from the fitting procedure. The silica reference curve is added for comparison.

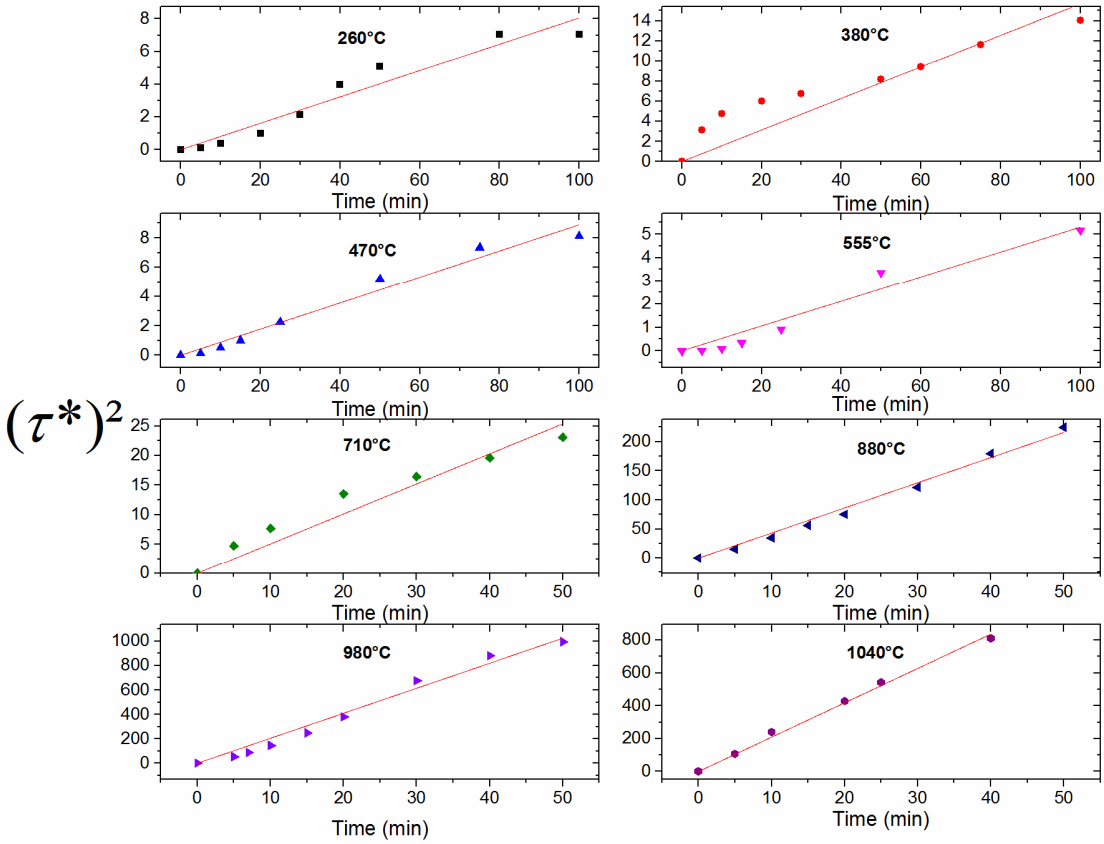


Figure S4 – Evolution of $(\tau^*)^2$ with time. A linear fit (red curve) allows the estimation of the parameter k at each temperature.