Supplementary Material (ESI) for Lab on a Chip

SUPPLEMENTARY INFORMATION

Quantitative Mapping of Aqueous Microfluidic Temperature with Sub-degree Resolution Using Fluorescence Lifetime Imaging Microscopy

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Tables S1 and S2

Fig. S1

Temperature	Lifetimes /ns			A-Factor				
/^{0}C	τ_1	τ_2	τ_3	A_1	A_2	A_3	τ_{av}	χ^2
22.9	1.80	3.77	11.06	0.55	0.40	0.05	3.03	1.04
29.1	1.85	4.03	11.60	0.51	0.42	0.07	3.46	1.05
30.5	1.89	4.09	11.64	0.50	0.43	0.07	3.53	1.06
31.1	1.83	4.10	12.74	0.44	0.46	0.10	3.97	1.07
31.6	1.94	4.49	14.47	0.43	0.38	0.19	5.33	1.19
31.9	2.10	5.92	15.39	0.39	0.30	0.31	7.36	1.08
32.2	2.33	7.40	15.67	0.25	0.27	0.48	10.13	1.07
32.7	2.10	7.16	15.53	0.16	0.28	0.56	11.00	1.06
33.1	2.47	7.95	15.68	0.12	0.29	0.59	11.84	1.04
33.7	2.24	8.23	16.20	0.09	0.31	0.61	12.55	1.01
34.3	2.36	8.21	15.66	0.06	0.29	0.64	12.64	1.00
34.7	2.50	8.53	15.71	0.06	0.30	0.64	12.77	1.02
35.2	2.33	7.55	15.37	0.03	0.26	0.71	12.90	1.05
36.3	2.91	9.09	16.29	0.05	0.32	0.64	13.37	1.00
37.3	2.32	8.35	15.99	0.03	0.28	0.69	13.41	1.05
38.3	3.26	8.04	15.95	0.01	0.29	0.70	13.51	1.03

Table S1. Decay parameters for TCSPC data obtained by fitting a 3-exponential function to individual decay curves (i.e. not global analysis). The fluorescence decay curves were analysed by tail-fitting (i.e. without convolution with the instrument response function), from 1 ns after the peak of the decay to correspond to the conditions used to fit the FLIM decays. The average lifetimes were used to generate the calibration curve shown in Figure 4 .

Global lifetimes: $\tau_1 = 2.16$ ns $\tau_2 = 6.02$ ns $\tau_3 = 15.1$ ns

Global $\chi^2 = 1.026$

Temperature /^{o}C	A_1	A_2	A_3	Local χ^2
22.9	0.88	0.11	0.01	1.00
29.1	0.82	0.17	0.01	1.04
30.5	0.81	0.18	0.01	1.04
31.1	0.77	0.20	0.03	1.07
31.6	0.70	0.20	0.10	1.12
31.9	0.57	0.22	0.21	1.05
32.2	0.34	0.23	0.43	1.04
32.7	0.24	0.25	0.51	1.04
33.1	0.14	0.27	0.59	1.04
33.7	0.14	0.19	0.67	1.06
34.3	0.03	0.28	0.69	1.02
34.7	0.01	0.29	0.70	1.04
35.2	0.00	0.30	0.70	1.06
36.3	0.05	0.19	0.76	1.05
37.3	0.03	0.19	0.78	1.05
38.3	0.02	0.20	0.78	1.04

Table S2. Decay parameters for TCSPC data obtained from global analysis of the decays. Decays were analysed by iterative reconvolution with the instrument response function to obtain precise decay parameters for the photophysical interpretation of the temperature dependence. These are the decay parameters presented in Figure 3.

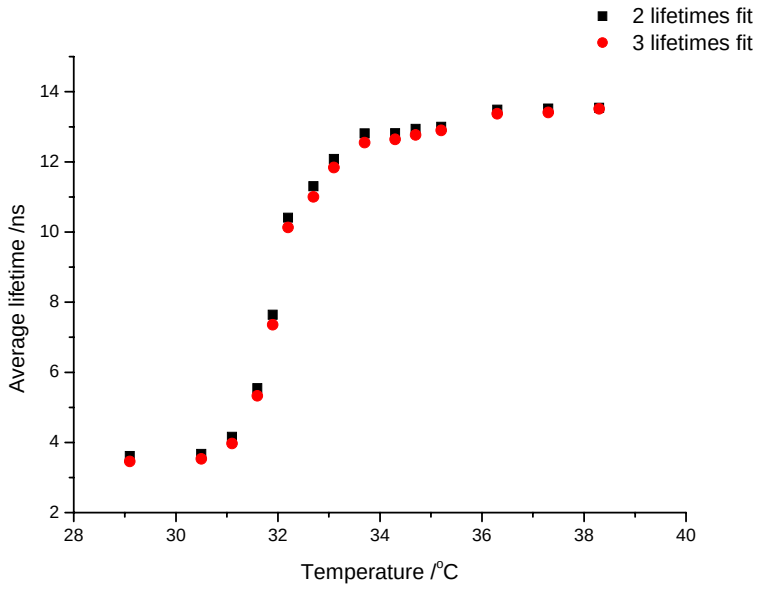

Figure S1: The average lifetimes determined by fitting two or three lifetimes to individual TCSPC decay curves, plotted as a function of temperature.