Electronic Supplementary Material (ESI) for RSC Advances.

Total protein concentration quantification using nanobeads with a new highly luminescent terbium (III) complex

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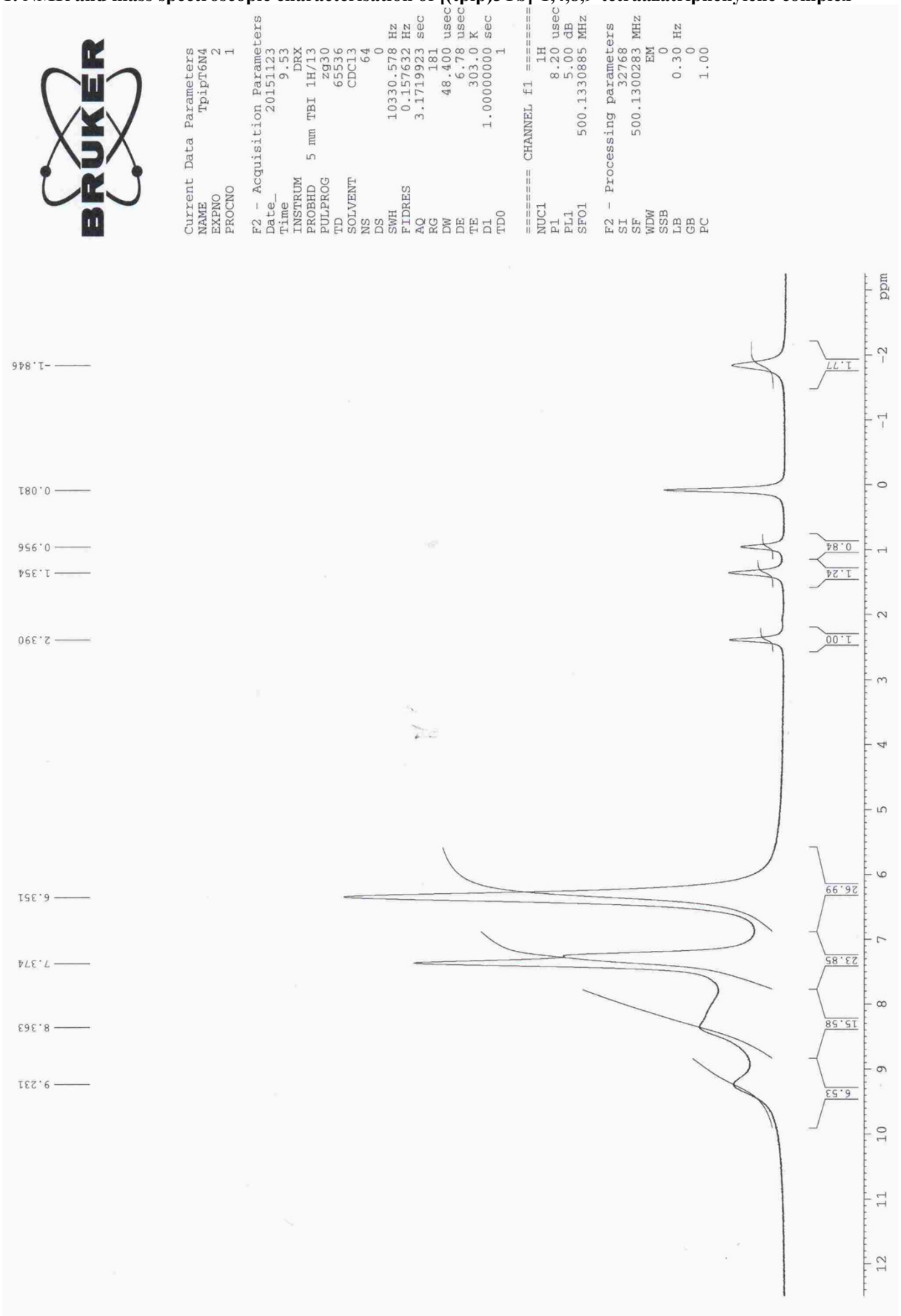
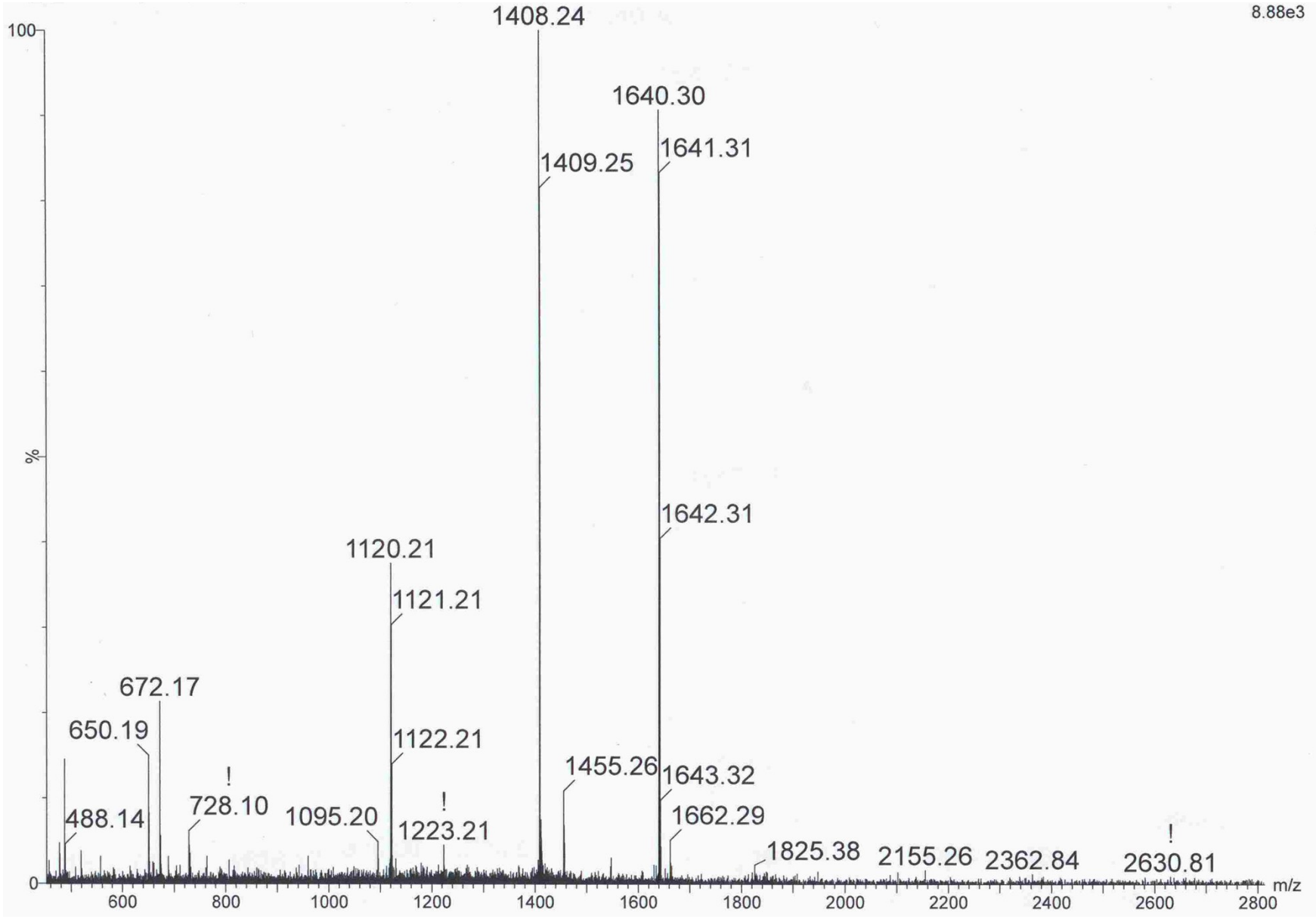
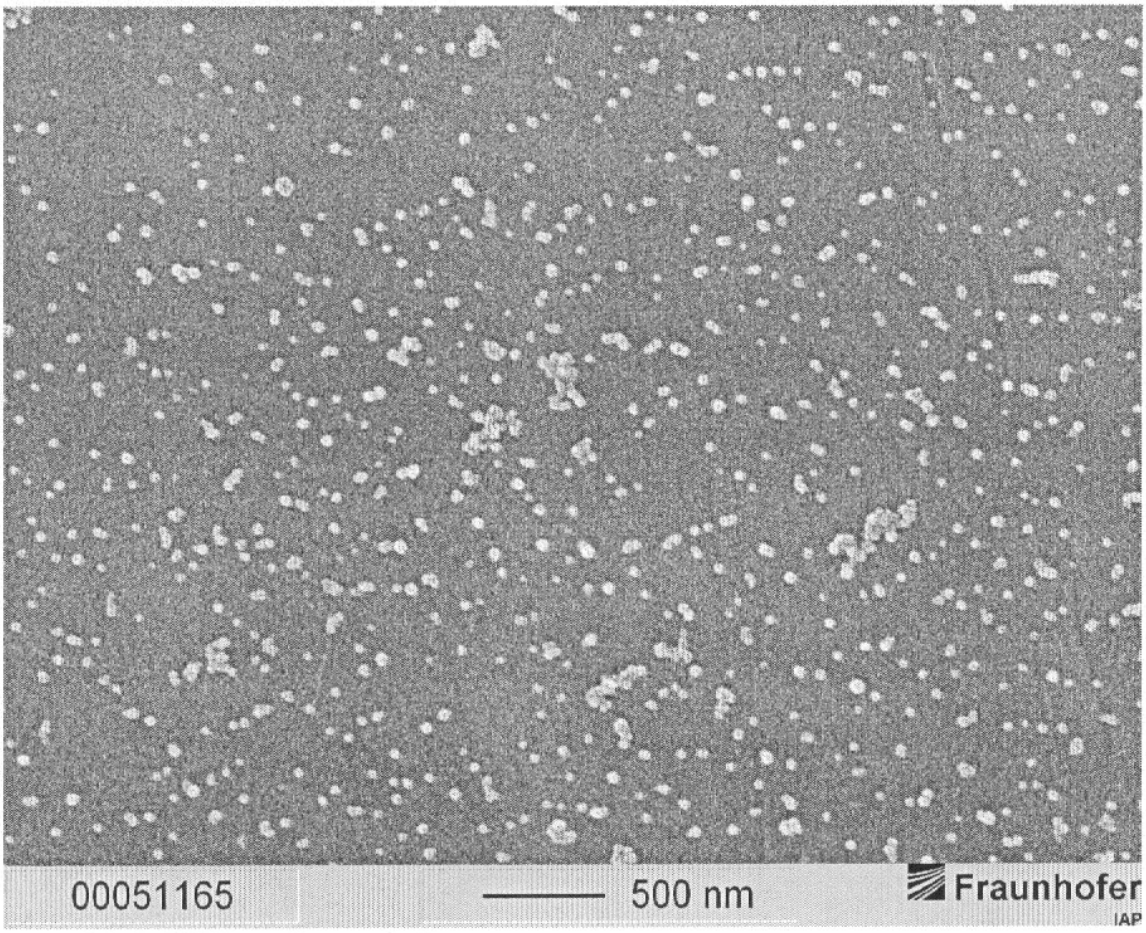
SUPPORTING INFORMATION

1. NMR and mass spectroscopic characterisation of [(tpip)3Tb]-1,4,8,9-tetraazatriphenylene complex

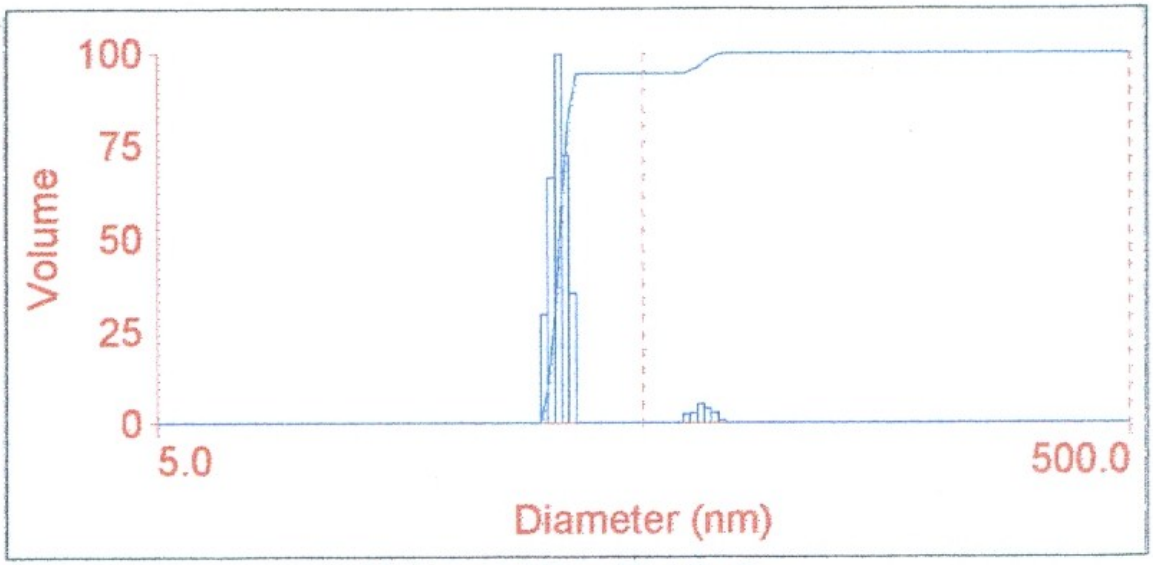



8.88e3
100
%
0
1408.24
1640.30
1409.25
1641.31
1642.31
1120.21
1121.21
672.17
650.19
1122.21
1455.26
1643.32
728.10
1095.20
1223.21
1662.29
488.14
1825.38
2155.26
2362.84
2630.81
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
m/z

2. REM image of nanoparticles



3. Results of DLS experiments



Multimodal Size Distribution

d(nm)	G(d)	C(d)	d(nm)	G(d)	C(d)	d(nm)	G(d)	C(d)
27.4	0	0	39.6	0	95	57.3	0	95
28.3	0	0	41.0	0	95	59.3	0	95
29.3	0	0	42.4	0	95	61.3	2	95
30.3	0	0	43.8	0	95	63.4	3	96
31.3	29	9	45.3	0	95	65.6	5	98
32.4	66	30	46.9	0	95	67.8	4	99
33.5	100	61	48.5	0	95	70.1	3	100
34.6	72	84	50.1	0	95	72.5	1	100
35.8	35	95	51.8	0	95	75.0	0	100
37.1	0	95	53.6	0	95	77.6	0	100
38.3	0	95	55.4	0	95	80.2	0	100

4. Results of the robustness test

Compound	Tolerable concentration [v/w %]
Sodium dodecyl sulphate	0.0002%
Cetyl trimethylammonium bromide	0.0003%
Sorbitan trioleate	2%
Polyethylene glycol sorbitan monolaurate	1%
Polyethylene glycol tert-octylphenyl ether	3%

The tolerable concentration is a concentration of a surfactant that resulted in maximum 20% change in the signal.

5. The calculation of Förster radius for the (Tpip)3Tb-(TAP)-Cy5 donor-acceptor pair

The Förster radius R_0 for the ((Tpip)3Tb-(TAP))-Cy5 donor-acceptor pair has been determined using following equation:

$$R_0 = \sqrt[6]{\frac{9\Phi_0(\ln 10)\kappa^2}{128\pi^5 n^4 N_A} J(\lambda)}$$

where $\mathbf{\Phi_0}$ is the donor quantum yield equal to 0.5 (determined using integrating sphere), $\mathbf{\kappa^2}$ is the dipole orientation factor taken as equal to 2/3 (random dipole orientation), $\mathbf{N_A}$ is the Avogadro's number (6.02 x 10^{23} mol^{-1}) and **n** is the refractive index of the surrounding medium (water n = 1.33). Based on the above equation and that the spectral overlap J(λ) is (3.2 ± 0.10) x 10^{15} L mol^{-1} cm^{-1} nm^4, the Forster radius $\mathbf{R_0}$ for the (Tpip)3Tb-(TAP)-Cy5 donor-acceptor pair was found to be (5.6 ± 0.1) nm.