Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information to

“Well-separated water-soluble carbon dots via gradient chromatography”

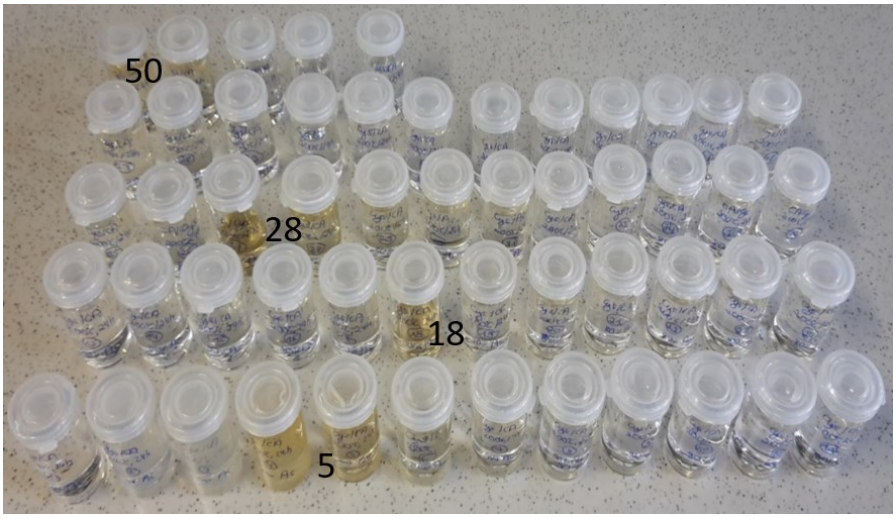

Fig. S1 Photograph of the synthesized fractions after gradient elution.

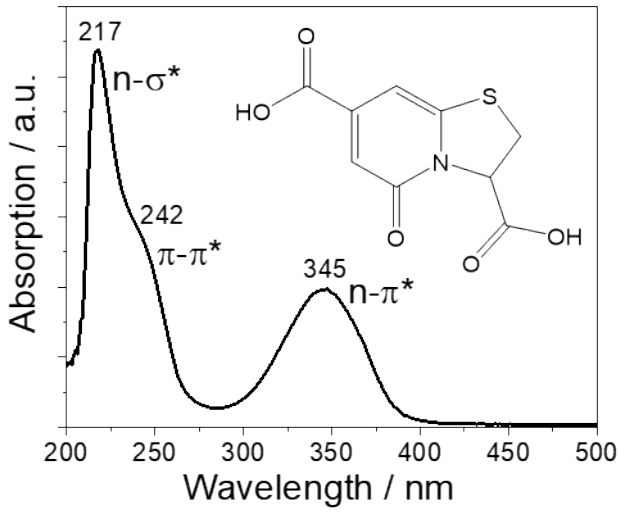

Fig. S2 UV-Vis spectrum of the pure fluorophore TPDCA including all expected absorption bands.

Tab. S1 All fraction numbers with the according retention time.

Fraction number	Retention time / min	Fraction number	Retention time / min	Fraction number	Retention time / min
1	15	19	202	37	384
2	28	20	212	38	394
3	41	21	220	39	405
4	54	22	230	40	415
5	65	23	240	41	427
6	75	24	251	42	440
7	85	25	260	43	451
8	95	26	270	44	463
9	104	27	280	45	475
10	118	28	290	46	487
11	124	29	303	47	497
12	132	30	308	48	508
13	142	31	317	49	519
14	152	32	329	50	526
15	162	33	339	51	536
16	172	34	349	52	546
17	182	35	359	53	558
18	192	36	371		

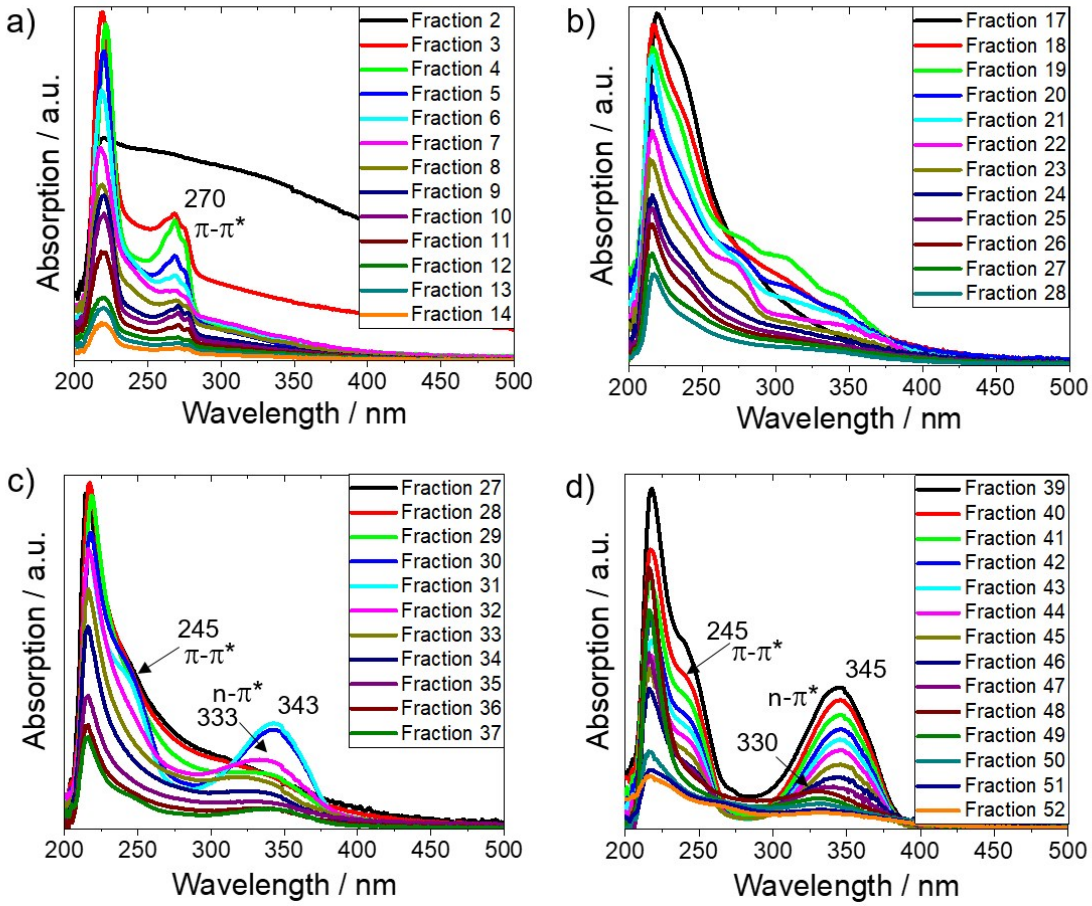

Fig. S3: UV-Vis absorption spectra of 200°C-CDs of (a) fractions 2-14, (b) fractions 17-28, (c) fraction 27-37, and (d) fractions 39-52. The π-π* and n-π* transitions at 245 nm and 345 nm, respectively, indicate pure TPDCA-fluorophores, the π-π* transition at 270 nm small-sized graphene or graphite and n-π* transitions between 330-333 nm converted TPDCA due to further reaction.

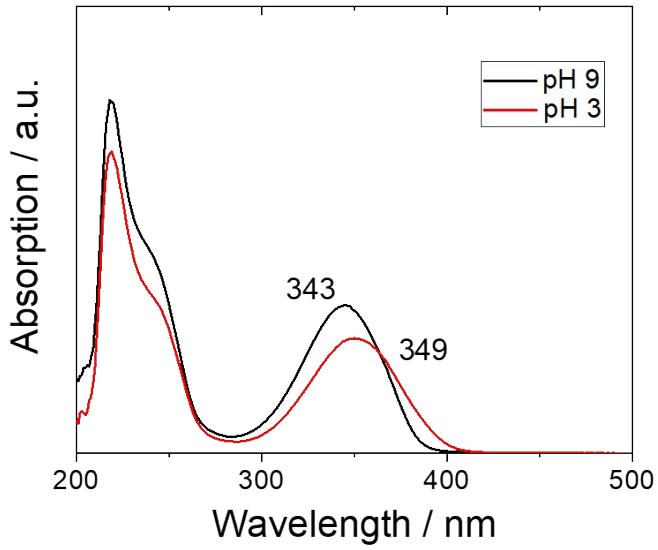

Fig. S4 UV-Vis absorption spectrum of TPDCA at pH 3 and 9.

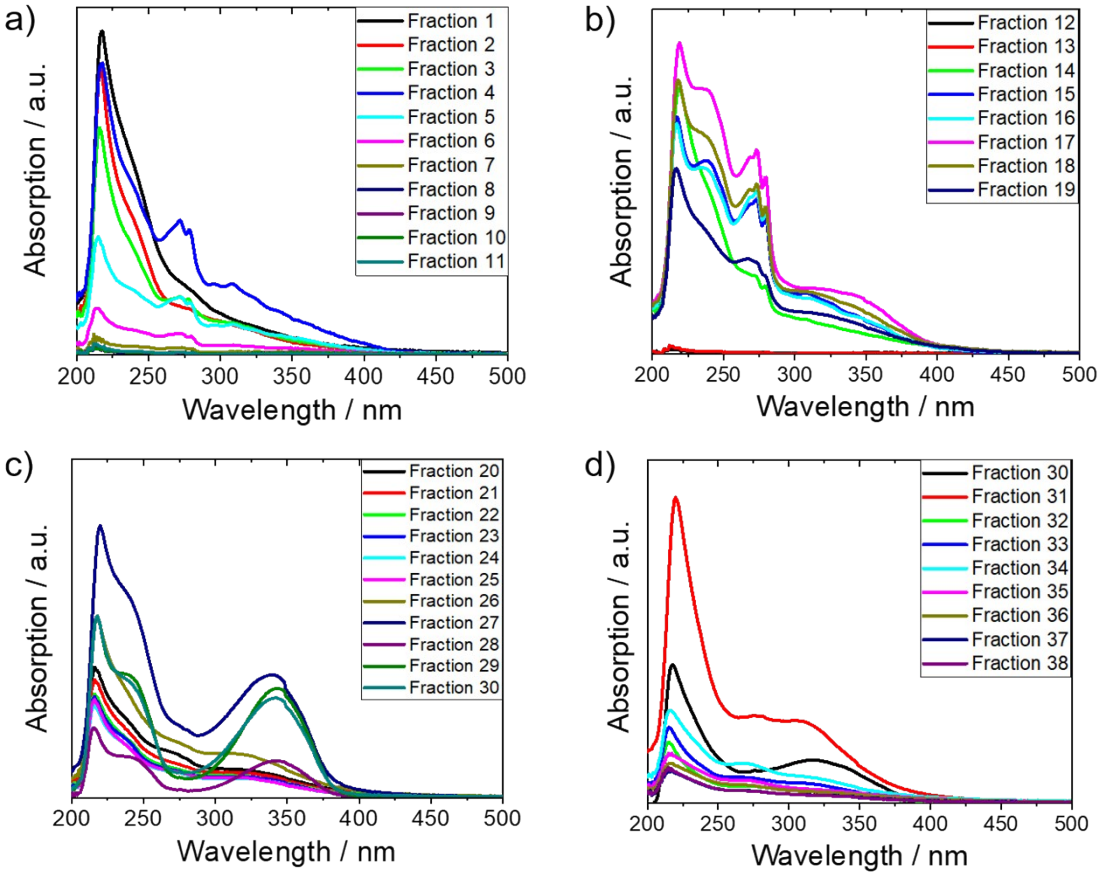

Fig. S5 UV-Vis absorption spectra of 250°C-CDs of a) fraction 1-11, b) fraction 12-19 c) fraction 20-30 and d) fraction 30-38.

Tab. S2: Assignment of all fractions to the corresponding batch of 250°C-CDs.

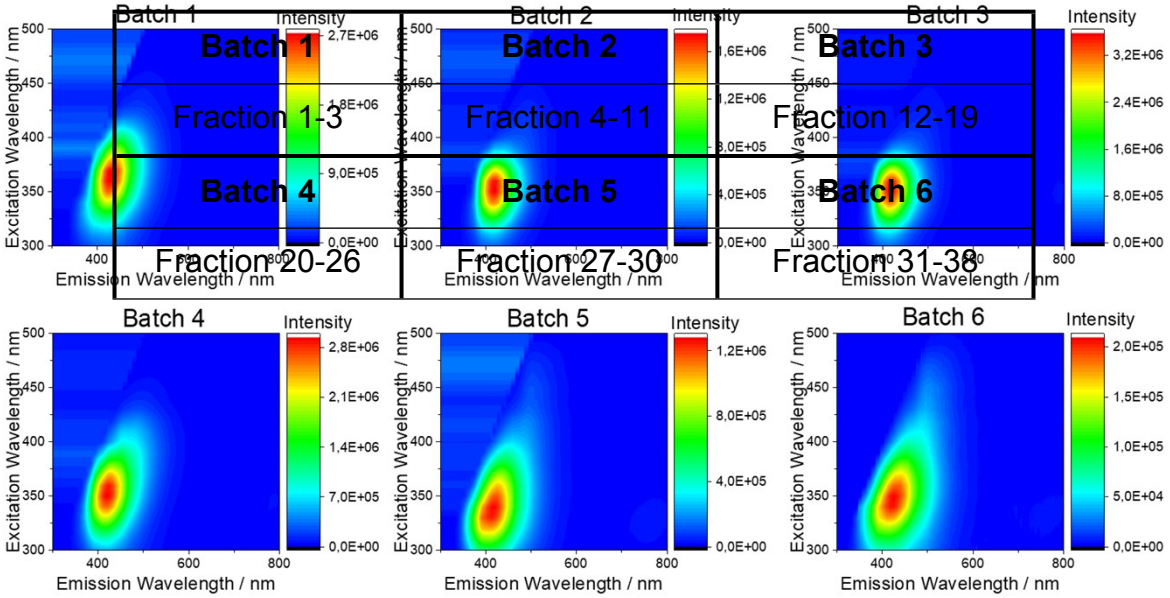

Fig. S6 3D fluorescence mapping spectra of fractions from batch 1 (fraction 2), batch 2 (fraction 5), batch 3 (fraction 15), batch 4 (fraction 20), batch 5 (fraction 30) and batch 6 (fraction 38) of 250°C-CDs measured between 350 and 800 nm emission wavelength upon excitation from 300 to 500 nm in decimal steps: Nearly all batches show low excitation dependency. Batch 5-6 reveal a stronger excitation dependency.

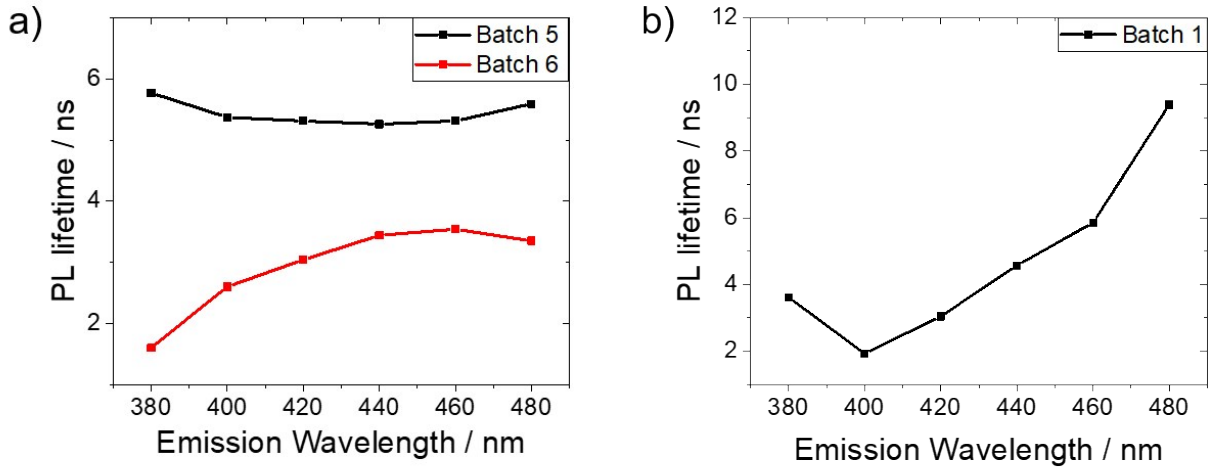

Fig. S7 Average PL lifetime measurements of fractions of batch 1 (fraction 4), batch 5 (fraction 40) and batch 6 (fraction 49) measured between 380 and 480 nm emission wavelength upon excitation at 355 nm. a) Fractions of batch 5 and 6 show the difference between pure fluorophore (batch 5) to further reacted fluorophores (batch 6); b) batch 1 shows the PL lifetime of the carbogenous product.

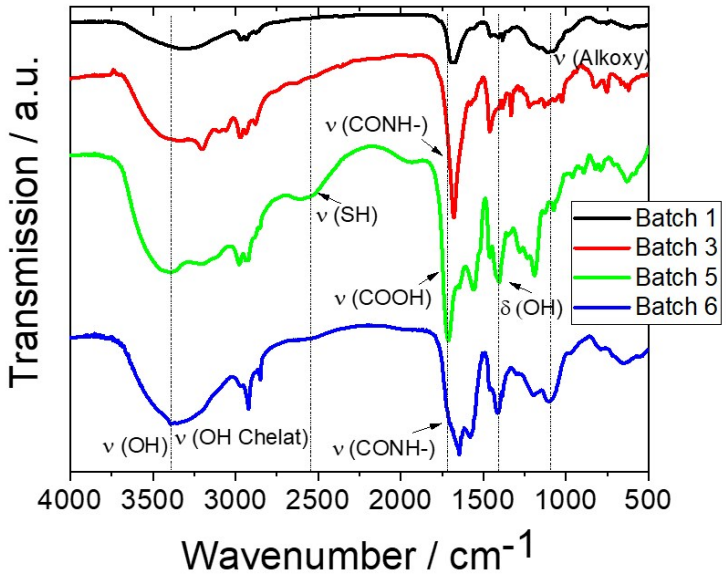

Fig S8 FTIR spectra of batch 1 (fraction 3), batch 3 (fraction 16), batch 5 (fraction 27) and batch 6 (fraction 33) of 250°C-CDs dried and measured with KBr between 4000 and 500 cm^{-1}.

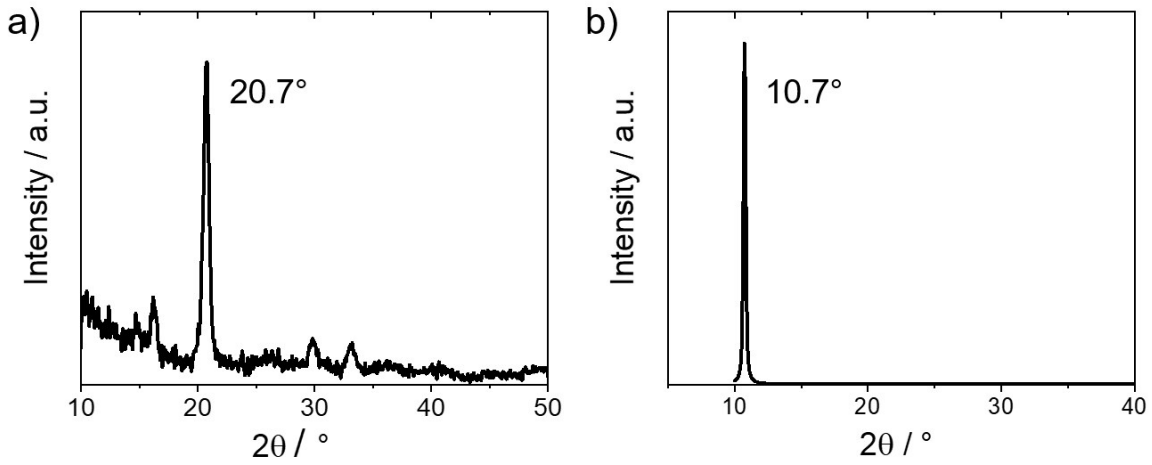

Fig. S9 XRD diffraction patterns from a) batch 6 of 200°C-CDs that indicates r-GO of high disorder and b) batch 1 of 250°C-CDs that reveals GO of less disorder.

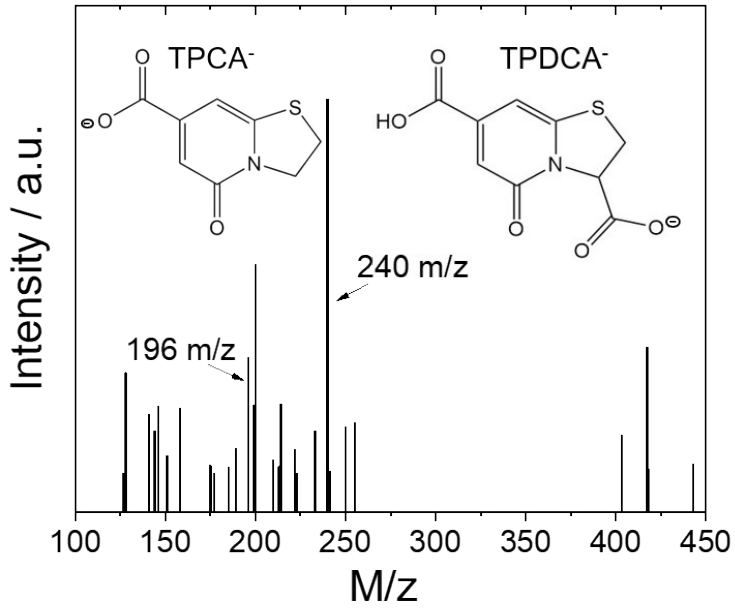

Figure S10: Mass spectrum of fraction 4 (from fractionated 200°C-CDs by gradient NP-HPLC) with the expected M/z=240 of TPDCA and M/z= 196 of TPCA.

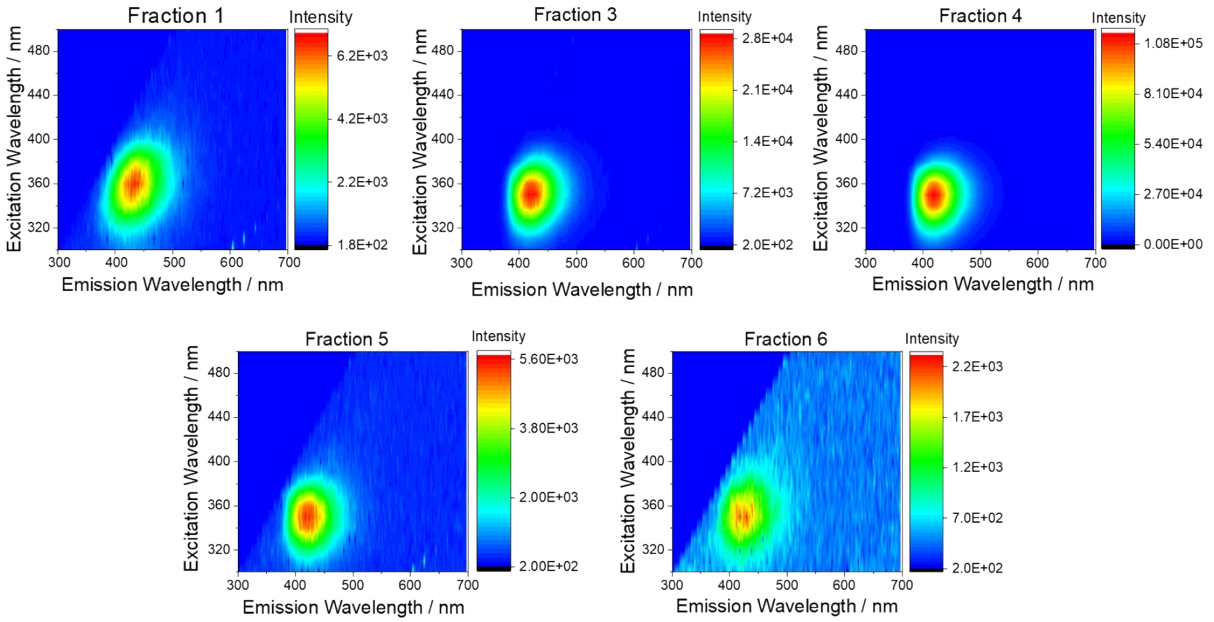

Fig S11 PL mapping spectra from fractions of 200°C-CDs from HPLC of gradient elution: the highest amount of TPDCA fluorophores is expected for fraction 3 and 4 due to the strongest PL intensity and excitation independency. Fraction 1 reveals excitation dependency with low PL intensity that belongs to carbogenous species. Fraction 2 indicates non-fluorescent by-products. Fraction 5-6 show low intensity with an independent excitation wavelength that could belong to CDs with integrated fluorophores.