Polyampholytic Graft Copolymers based on Polydehydroalanine (PDha) – Synthesis, Solution Behavior and Application as Dispersants for Carbon Nanotubes

J. B. Max,[1,2,3] D. V. Pergushov,[4] L. V. Sigolaeva,[4] F. H. Schacher,[1,2,3] *

[1] Institute of Organic Chemistry and Macromolecular Chemistry (IOMC), Friedrich-Schiller-University Jena, Lessingstraße 8, D-07743 Jena, Germany
[2] Jena Center for Soft Matter (JCSM), Friedrich-Schiller-University Jena, Philosophenweg 7, D-07743 Jena, Germany
[3] Center for Energy and Environmental Chemistry (CEEC), Friedrich-Schiller-University Jena, Philosophenweg 7, D-07743 Jena, Germany
[4] Department of Chemistry, M.V. Lomonosov Moscow State University, Leninskie Gory 1/3, 119991 Moscow, Russia
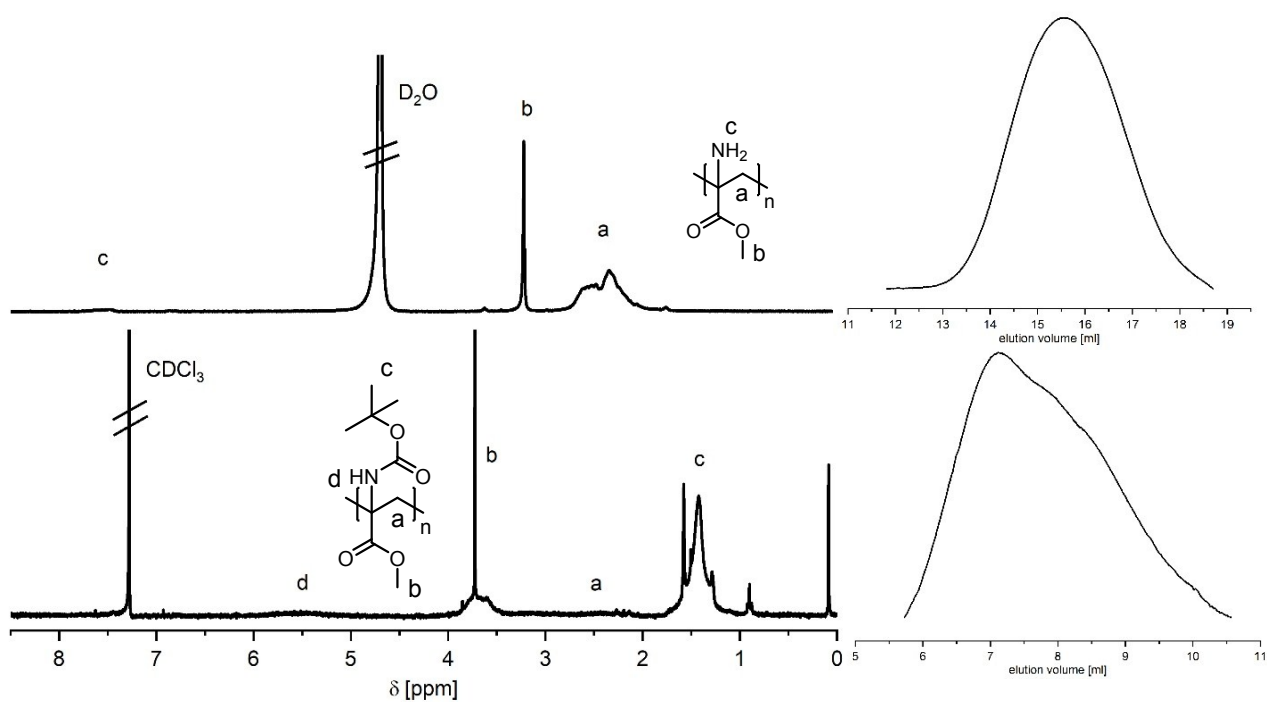
Email: felix.schacher@uni-jena.de

Figure S1: ^{1}H-NMR spectra of PtBAMA (bottom, in CDCl$_3$) and PAMA (top, in D$_2$O+NaOD) with the corresponding SEC traces of PAMA (DMSO with 0.5 % LiBr) and PtBAMA (CHCl$_3$/iPrOH/NEt$_3$).
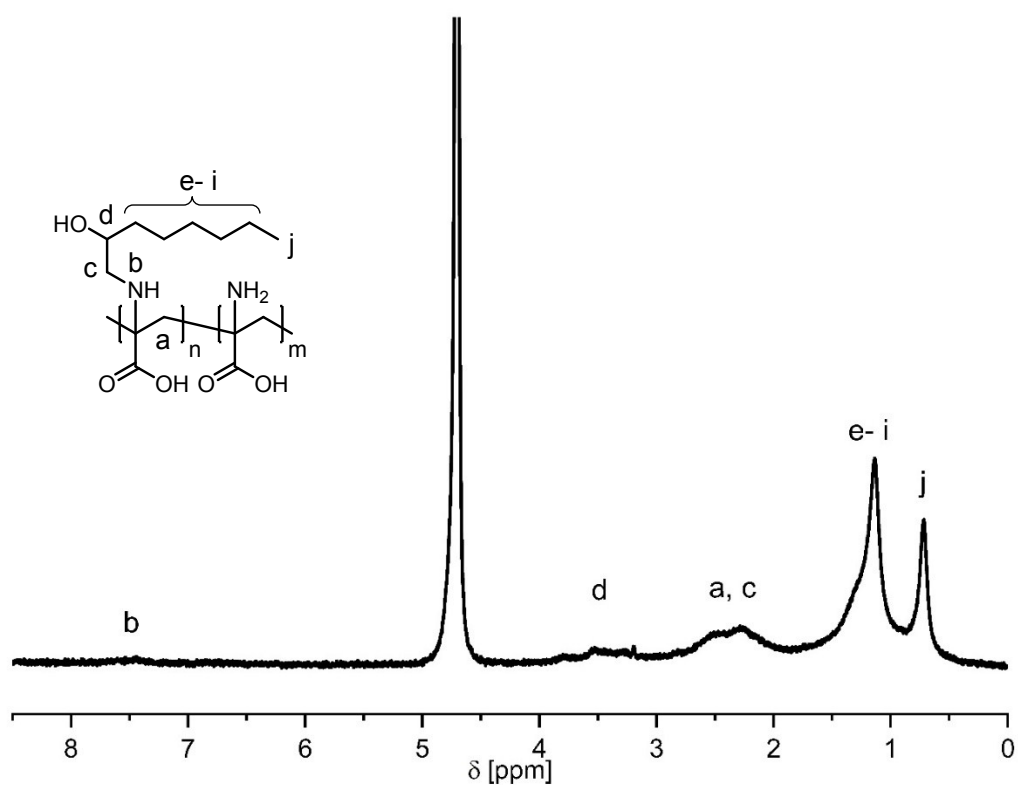
Figure S2: ^{1}H-NMR spectrum of PDha$_{EOct70}$ in D$_2$O+NaOD.
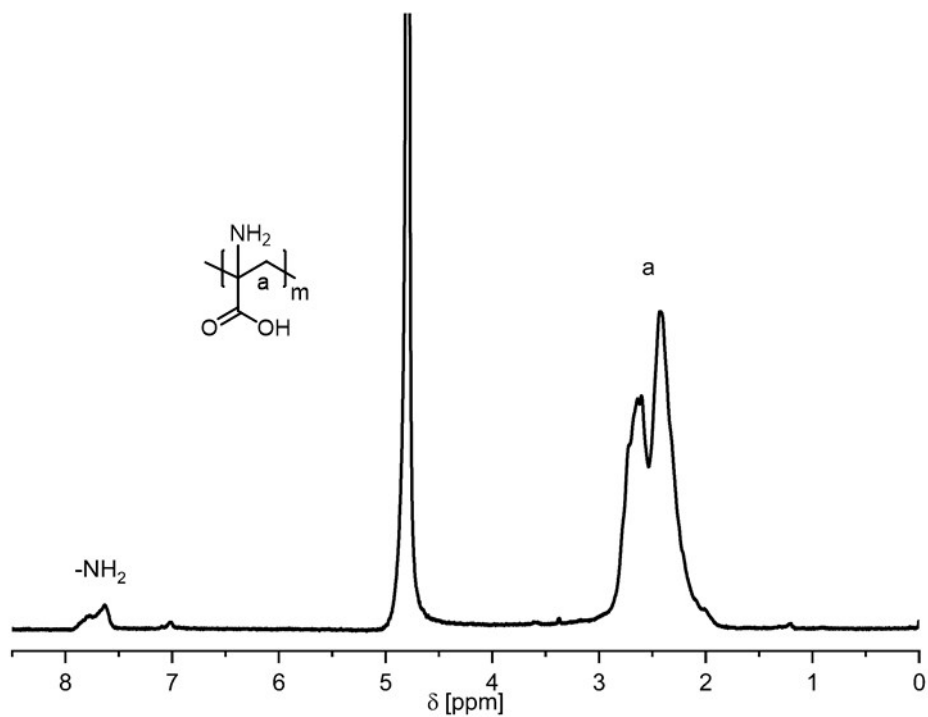
Figure S3: ^{1}H-NMR spectrum of PDha in D_2O+NaOD.
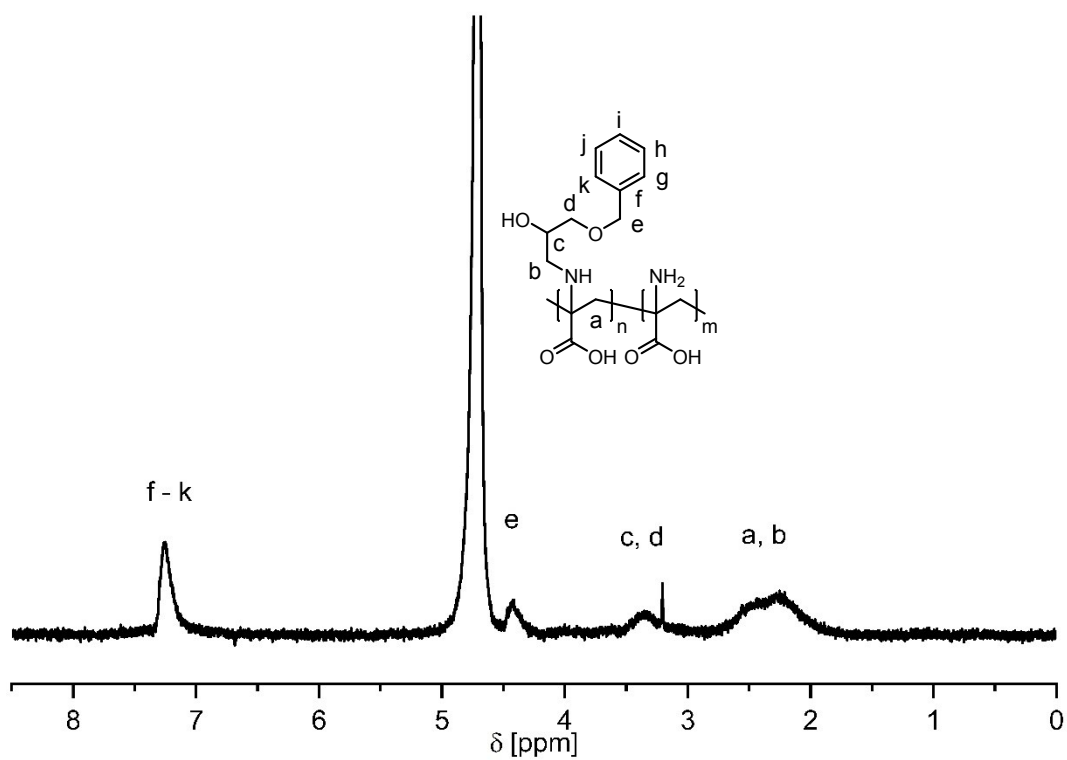
Figure S4: ^{1}H-NMR spectrum of PDha$_{BGE20}$ in D_2O+NaOD.

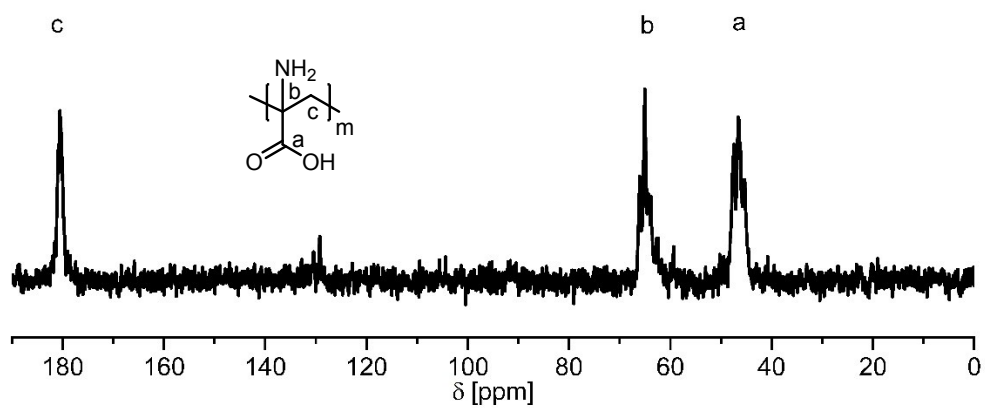**Figure S5**: ^{13}C-NMR spectrum of PDha in D_2O + NaOD.

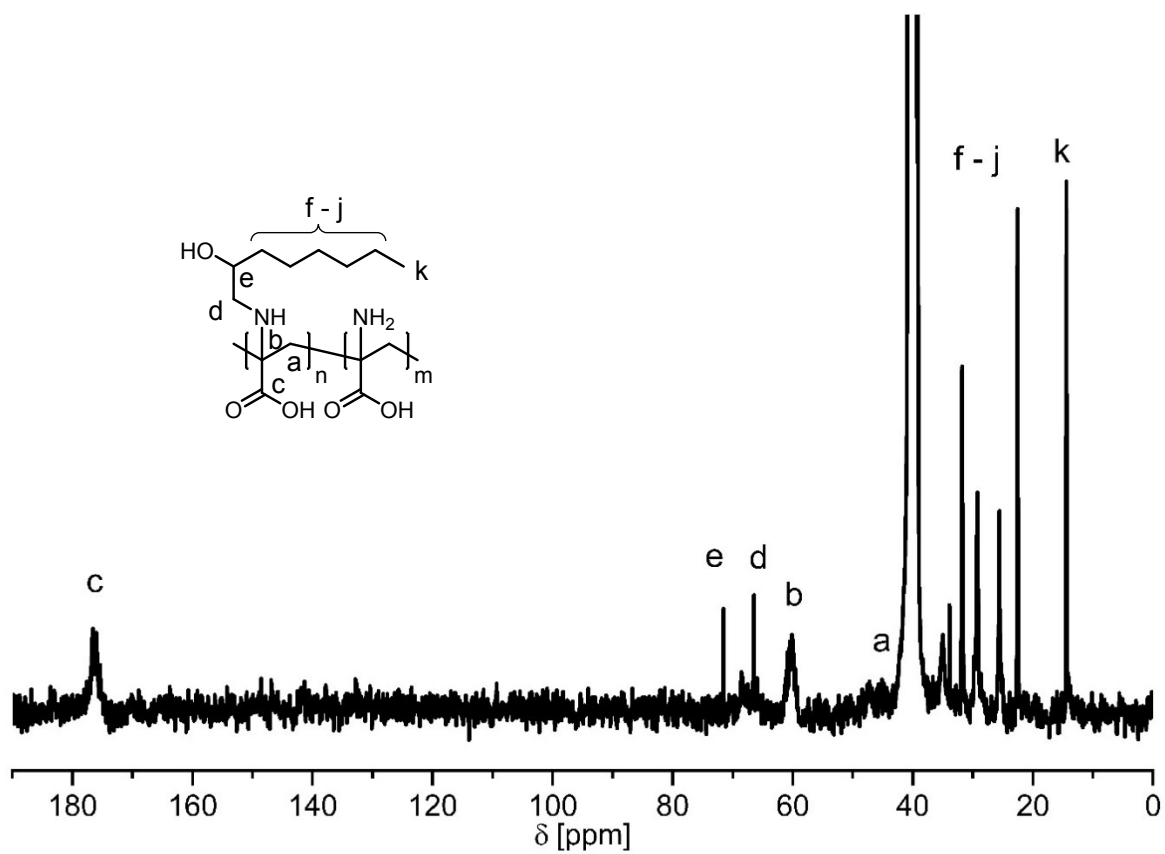**Figure S6**: ^{13}C-NMR spectrum of PDha$_{EOct70}$ in DMSO-d$_6$.
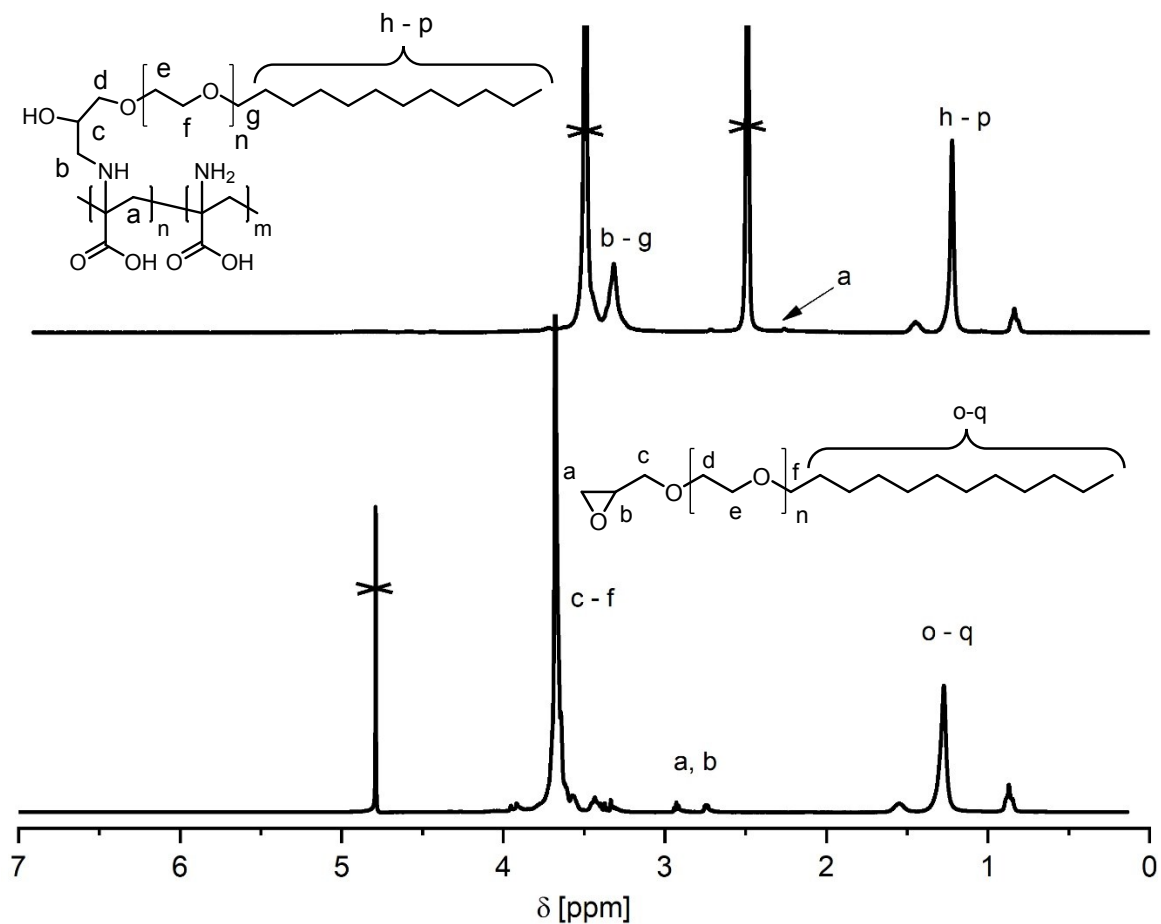
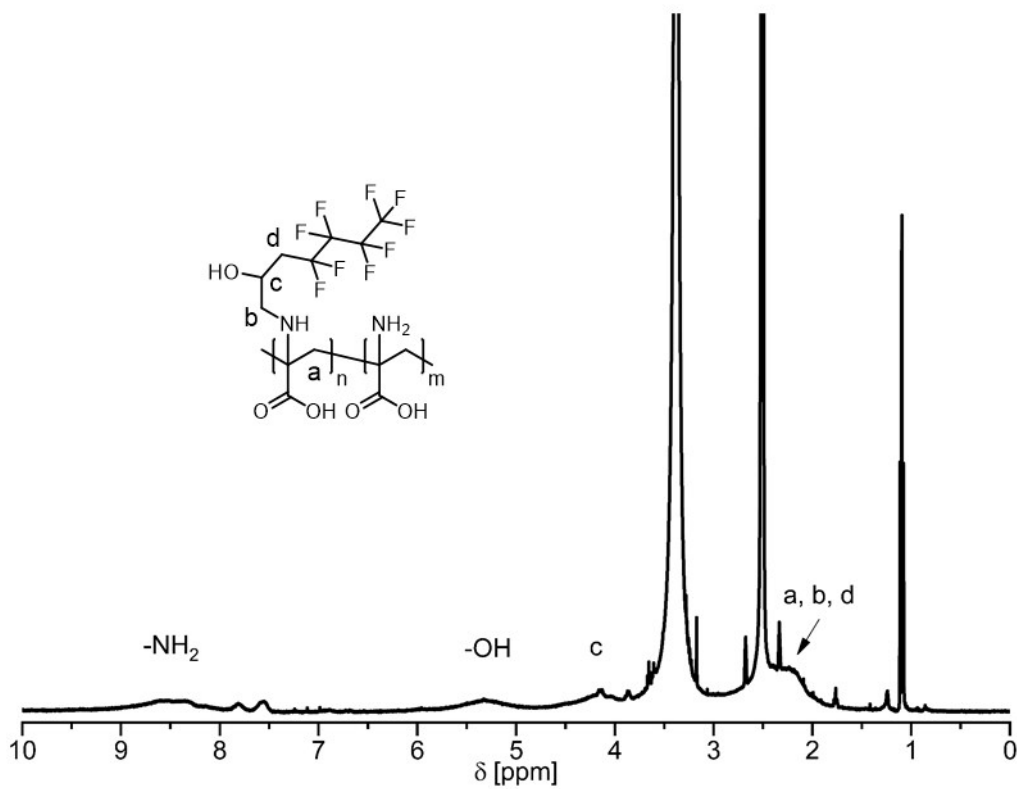**Figure S7**: ^{1}H-NMR spectrum of PEO-LGE (bottom, in D_2O) and PDha$_{PEO-LGE33}$ (top, in DMSO-d$_6$).

Figure S8: ^{1}H-NMR spectrum of PDha$_{NFPO65}$ in DMSO-d$_6$.
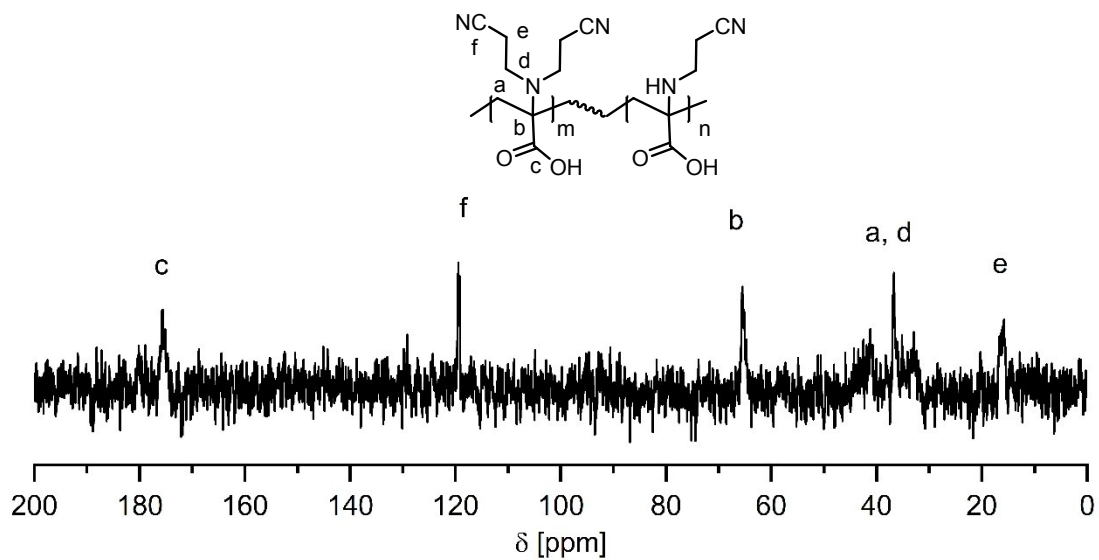
Figure S9: ^{13}C-NMR spectrum of PDha$_{ACN130}$ in D$_2$O+NaOD.
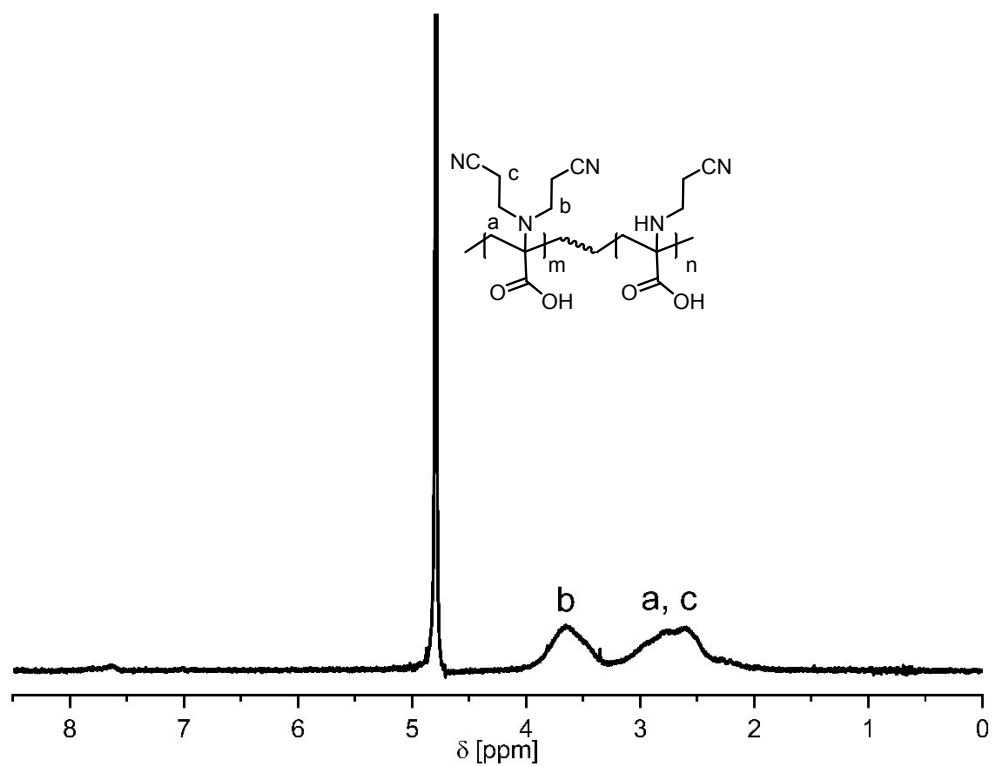

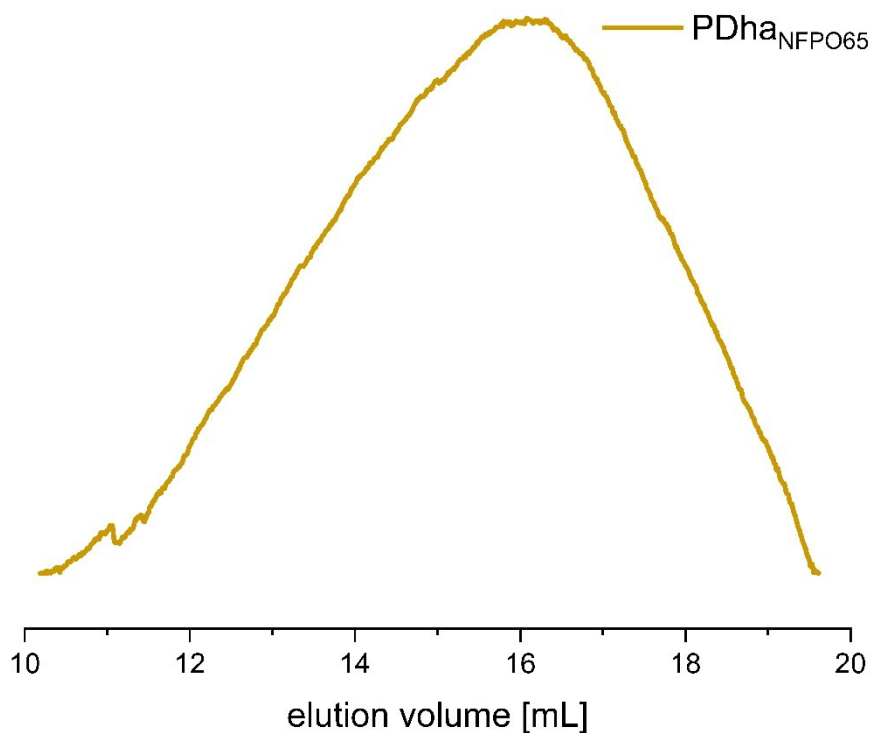**Figure S10**: ^{1}H-NMR spectrum of PDha$_{ACN130}$ in D$_2$O+NaOD.

Figure S11: SEC traces of PDha$_{NFPO65}$ measured in DMSO+0.5 % LiBr (Pullulan calibration).
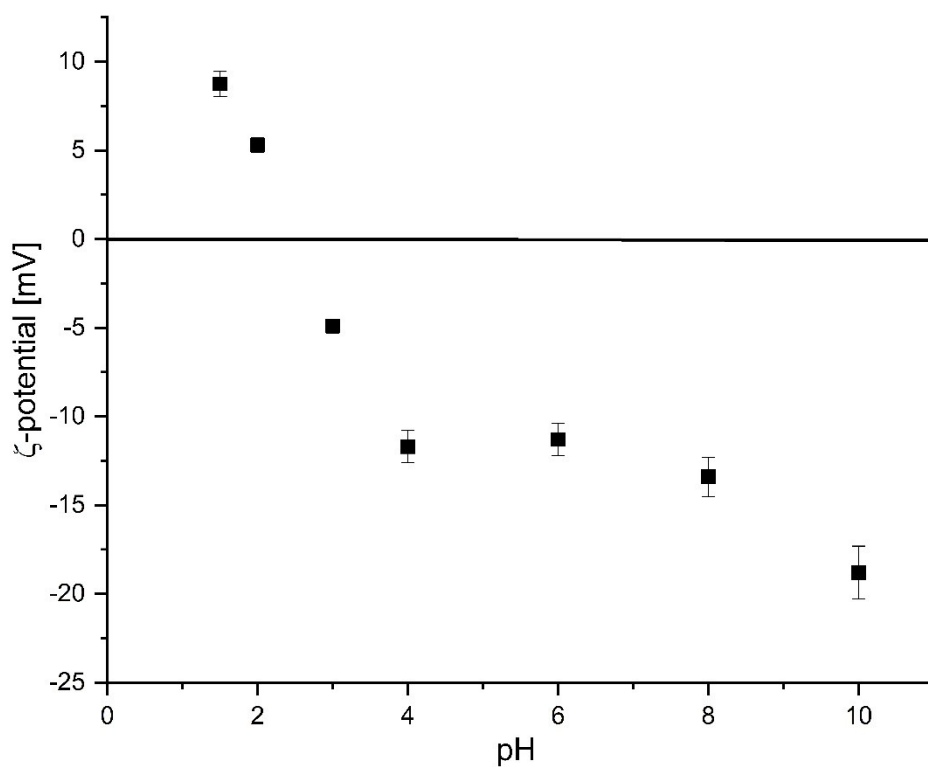

Figure S12: ζ-potential of PDha$_{ACN130}$ at different pH-values revealing charge neutrality above a pH of 2.
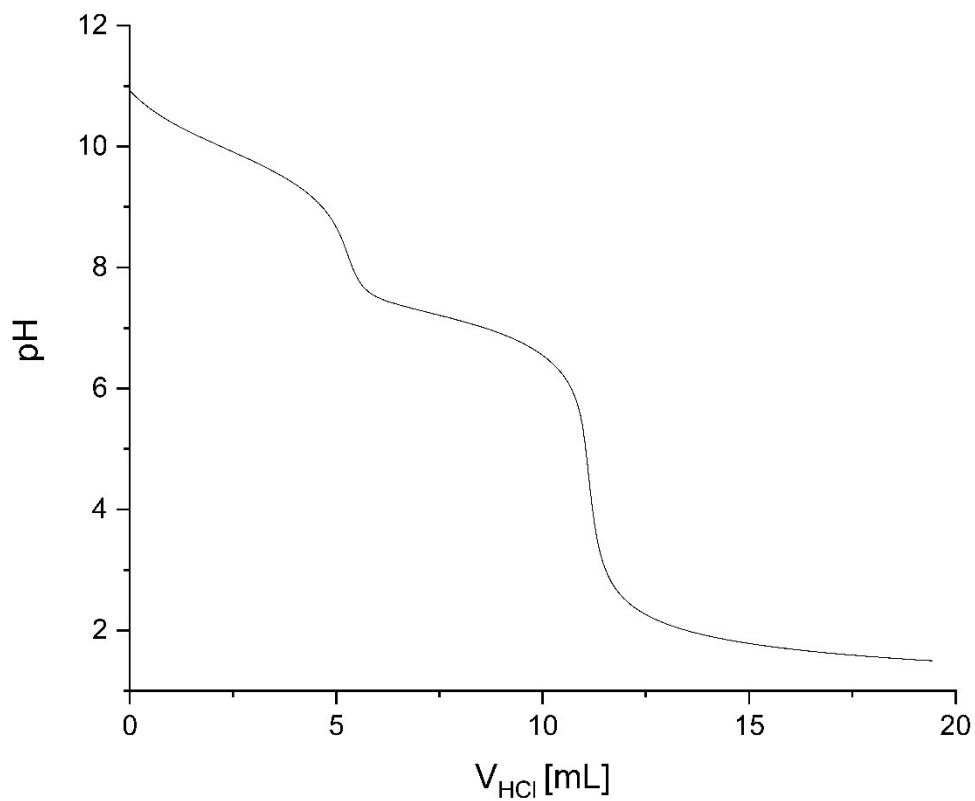
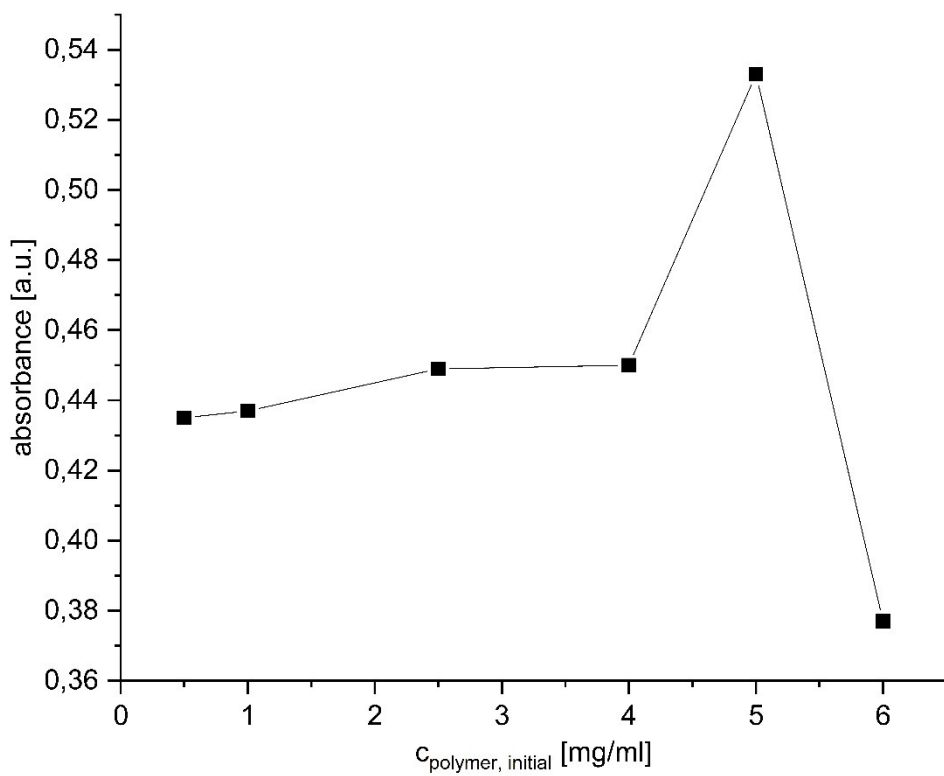**Figure S13**: Titration curve of PDha$_{EOct70}$.

Figure S14: UV-Vis absorbance at a wavelength of 500 nm of the MWCNT (1 mg/mL) dispersions with increasing surfactant (PDha$_{EOct70}$) starting concentrations.

Equation S1: Calculation of the DF of PDha$_{\text{NFPO}}$ and PDha$_{\text{PEO-LGE}}$

$$DoF\ [\%] = \frac{n\left(C_{per\ N\ found\ by\ elemental\ analysis}\right) - n\left(C_{PDha}\right)}{n\left(C_{modifier}\right)}$$

$$n\left(C_{per\ N\ found\ by\ elemental\ analysis}\right) = \frac{\dfrac{wt\%\ (C)}{M\ (C)}}{\dfrac{wt\%\ (N)}{M\ (N)}}$$

Table S1: Results of elemental analysis.

composition [%]	PAMA	PDha	PDha$_{\text{NFPO}}$	PDha$_{\text{PEO-LGE}}$
C	41.79	42.76	34.47	55.53
H	5.54	5.23	2.2	8.84
N	15.03	15.9	4.97	3.49
remaining	37.64	36.11	58.36	32.14