Supporting Information

Weak polyampholytes at the interface of magnetic nanocarriers: A facile catch and release platform for dyes

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Figure S1: A-F: TEM micrographs of pristine MCNP.



Figure S2: SEC elution traces of the used polyampholytes A) PDAGA (0,1 M Na₂HPO₄/0,05% NaN₃ pH 9, PAA calibration), B) PImAA (0,1 M Na₂HPO₄/0,05% NaN₃ pH 9, PAA calibration), C) PDha (DMAc/LiCl SEC, PMMA calibration).



Figure S3: Thermograms of PImAA@MCNP after coating at different pH values.



Figure S4: A) Thermograms of MCNP (black line) and PImAA@MCNP after synthesis (red line) and after exposure to different pH values: after exposure to pH 12 (green line), after exposure to pH 10 (blue line), after exposure to pH 2.7 (cyan line), B) thermograms of PDha@MCNP directly after synthesis (black, line) and after 0.5 years of storage (red, line).

Equation S1: Formula used for the calculation of shell thickness according to TGA

$$r_{s} = \sqrt[3]{r_{c}^{3} + \left(r_{c}^{3}\left(\frac{\rho_{c}}{\rho_{s}}\right)\left(\frac{WL}{RM}\right)\right)} - r_{c}$$

 r_s ...shell thickness

- r_c ... core radius (from DLS: MCNP $\langle R_h \rangle_{n,app}$ = 45 nm)
- ρ_c ... core density (approx. 5.2 g/cm3)
- ρ_s ... density of shell material (approx. 1.1 g/cm3)

WL ... weight loss

RM ... residual mass



Figure S5: A) number-weighted DLS CONTIN plots of PDha@MCNP at different pH values; B) Hydrodynamic maxima of number-weighted DLS CONTIN plots of PDha@MCNP at different pH values.



Figure S6: A) PDAGA@MCNP at different pH values; B) Hydrodynamic maxima of number-weighted DLS CONTIN plots of PDAGA@MCNP at different pH values.



Figure S7: A) intensities of the PDI-4PyI main absorbance band (542 nm) before and after dispersion of pristine MCNP, washing steps, and release solutions at pH = 2, B) intensities of the PDI-4S main absorbance band (564 nm) before and after dispersion of pristine MCNP, washing steps, and solutions at different pH-values.

Concentration calibration curves of PDI-4Pyl (pH = 7) and PDI-4S (pH = 2)



Figure S8: Calibration curves for concentration calculation of A) PDI-4PyI (pH = 7) and B) PDI-4S (pH = 2).



Saturation concentration of PDI-4Pyl on different systems at pH = 7

Figure S9: A) Adsorption isotherm of PDI-4Pyl to PDAGA@MCNP and PDha@MCNP. Conditions: Particles: 2 mg/ml; PDI-4Pyl: 1–50 μ g/ml; temperature: 25 °C; pH: 7 B) A plot of C_e/q against C_e for the adsorption of PDI-4Pyl on PDAGA@MCNP resulting in a value for q_m = 18.14 μ g/mg C) A plot of C_e/q against C_e for the adsorption of PDI-4Pyl on PDha@MCNP resulting in a value for q_m = 11.36 μ g/mg.



Saturation concentration of PDI-4S on different systems at pH = 2

Figure S10: A) Adsorption isotherm of PDI-4S to PDAGA@MCNP, PDha@MCNP, and PImAA@MCNP. Conditions: Particle concentration 2 mg/ml; PDI-4S: 1–50 µg/ml; temperature: 25 °C; pH: 2 B) A plot of C_e/q against C_e for the adsorption of PDI-4S on PDAGA@MCNP resulting in a value for q_m = 47.30 µg/mg C) A plot of C_e/q against C_e for the adsorption of PDI-4S on PDha@MCNP resulting in a value for q_m = 15.63 µg/mg D) A plot of C_e/q against C_e for the adsorption of PDI-4S on PDHa@MCNP resulting in a value for q_m = 50.48 µg/mg.