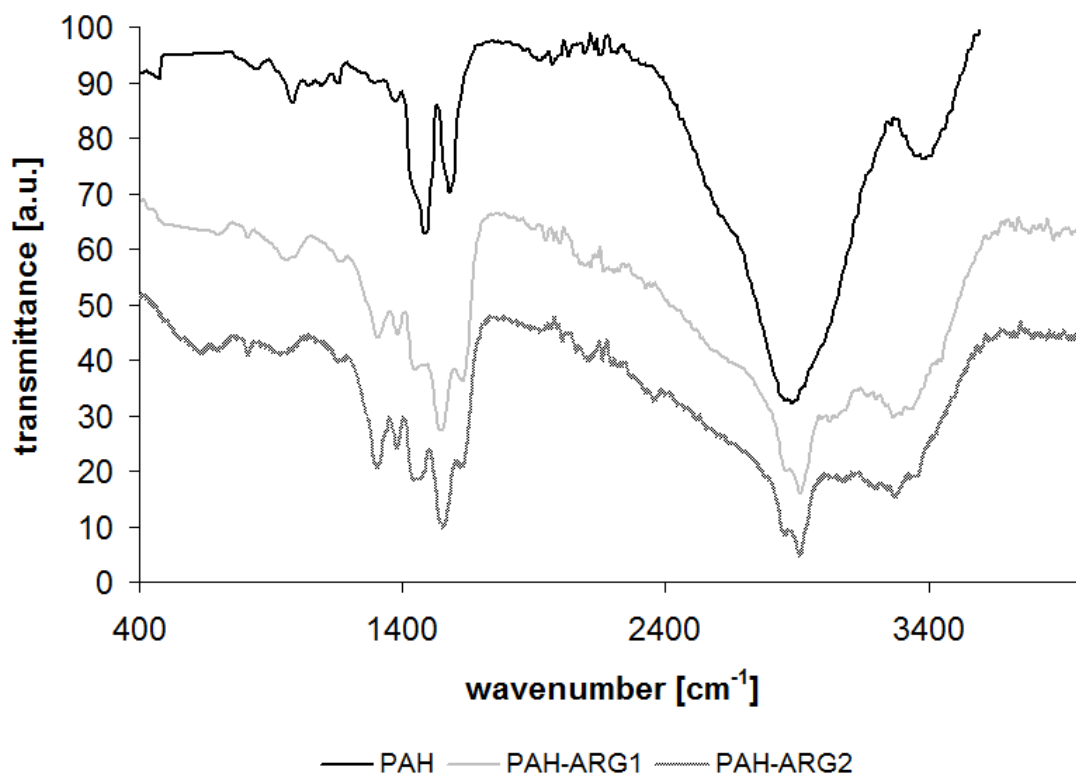# Supplementary data

Fig. S1. Comparison of FT-IR spectra of PAH, PAH-ARG1 and PAH-ARG2. The modification of PAH is confirmed by the appearance of bands originating from 3321 cm^{-1} NH stretching vibrations in the group-CONH-(trans), 1620 cm^{-1} deformation vibrations of C=O, and 1314 cm^{-1} and 1550 cm^{-1} symmetric deformation vibrations of NH$_3^+$ characteristic of amino acids
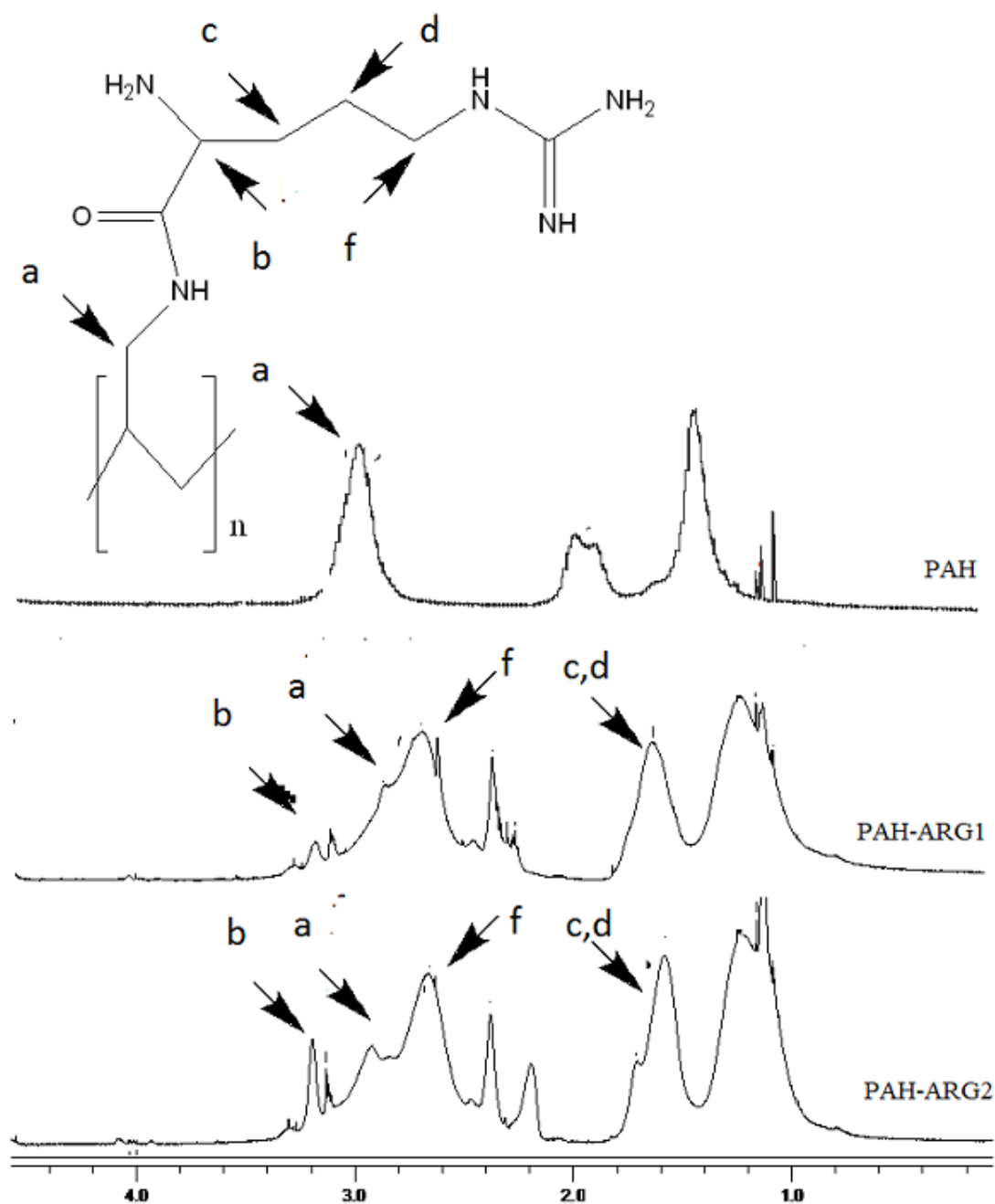
Figure. S2 Comparison of 1H NMR spectra of PAH, PAH-ARG1, and PAH-ARG2 confirm polymer modification. In the spectra of derivative of PAH there are numerous new peaks (b,c,d,f) originating from the CH2 protons located close to the amino and amide groups characteristic of amino acid side chain groups. NMR spectra were measured in D2O using a Bruker AMX 500 spectrometer.
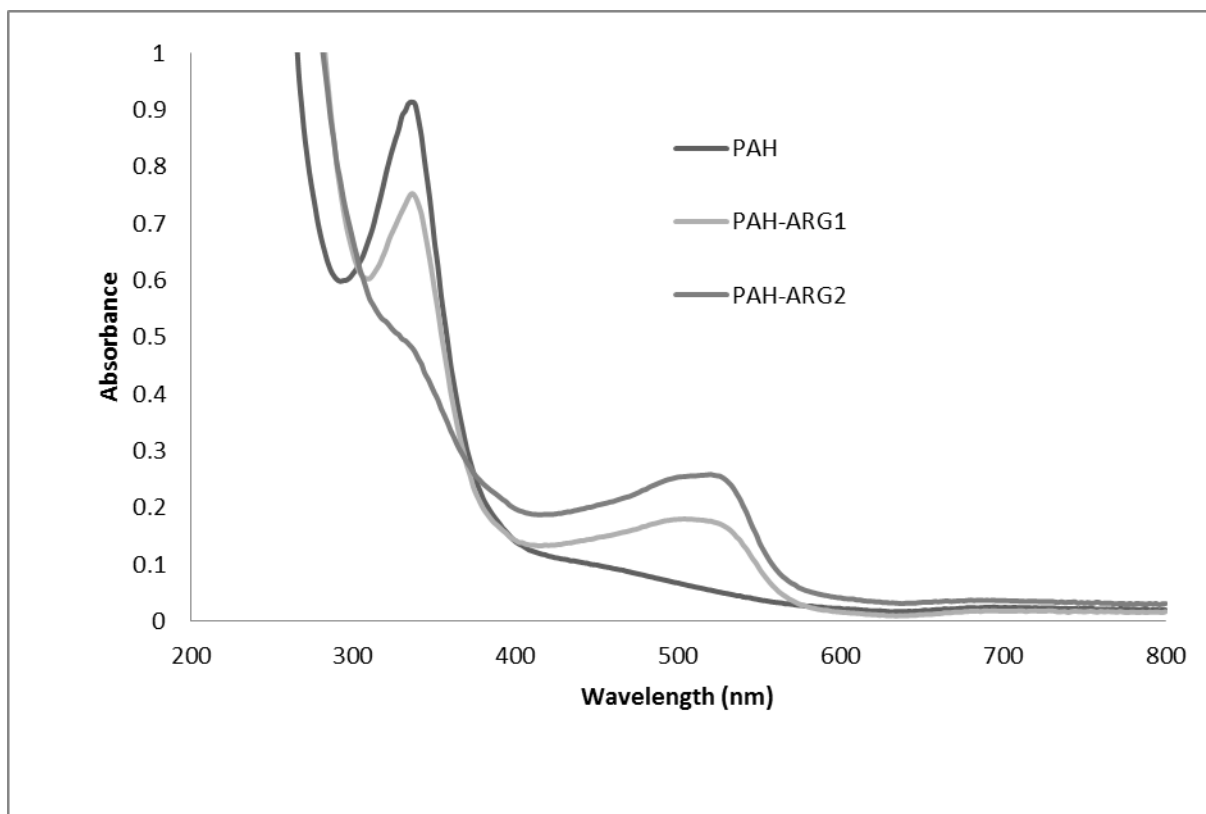
Figure S3. The UV-VIS spectra of the products of the reaction of PAH and PAH derivatives (c_p=1 g/l)) with α-naphthol in the presence of NaBrO

The degree of substitution of PAH-ARG polymers with arginine moieties was calculated using the formula:

$$DS = \frac{n}{0.01754} * 100\%$$

where:
n- number of moles of arginine in 1 ml of 1 mg/ml solution of PAH determined using Sakaguchi method.
0.01754- number of moles of allylamine monomer units in 1 ml of 1 mg/ml solution of PAH.
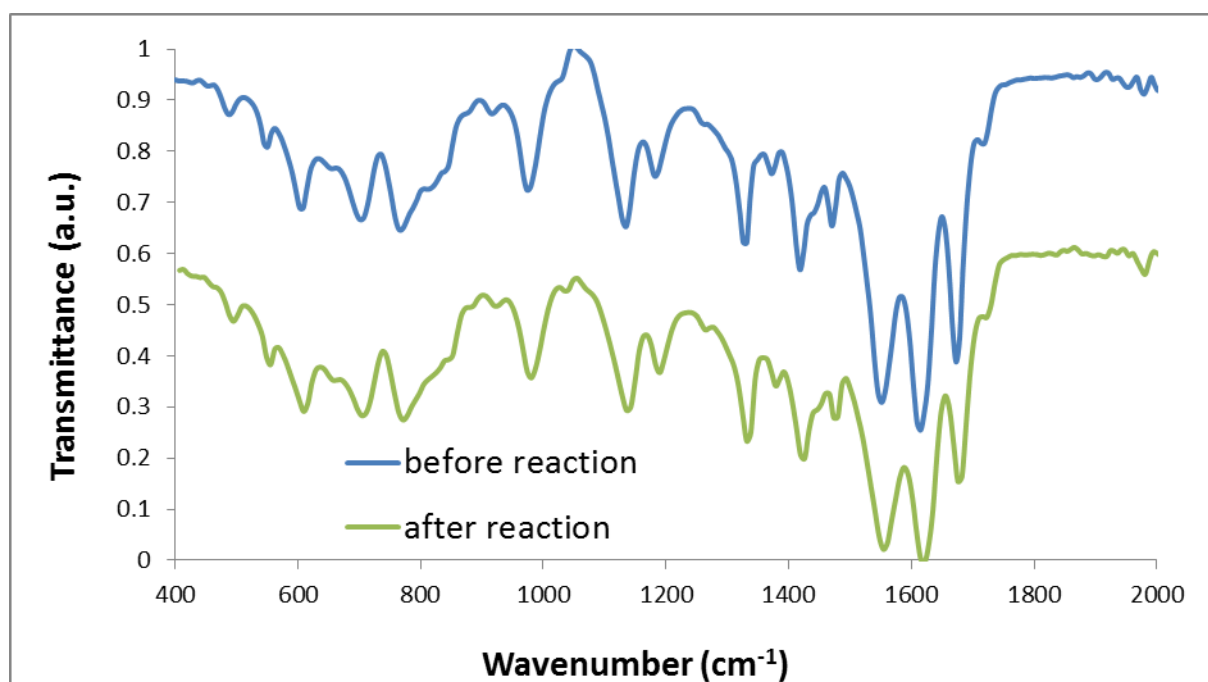
Figure S4. IR spectra of the reactants before and after reaction performed under the same conditions as for substitution of PAH with arginine (arginine and EDC/NHS concentration, temperature, solvent), except the mixture did not contain PAH. The spectra are virtually identical what suggests that arginine condensation does not occur under these conditions.
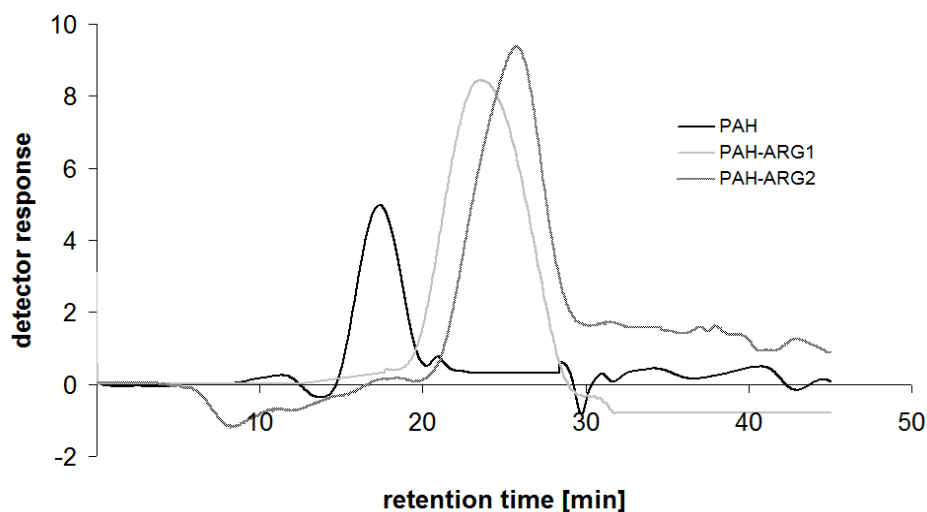
Figure S5. GPC chromatograms of PAH, PAH-ARG1, and PAH-ARG2. Substitution with arginine reduces hydrodynamic volumes of polymer. PAH-ARG2 has greater molecular mass of the two derivatives of PAH. Presence of a single peak in the chromatograms proves that the purified polymer is not contaminated with low molecular weight condensation products of arginine (polyarginine). GPC analyses were performed using a Waters GPC system equipped with a column dedicated to the measurements of polycations (Bioscience TSK gel 65000PWXL-CP) and a Waters RI detector. The eluent was 0.1 M NaNO$_3$ aqueous solution (pH=5.8), flow rate was 0.5 mL/min, sample volume was 30 µL, and the concentration of polymer solutions was of 1.0 g/L.
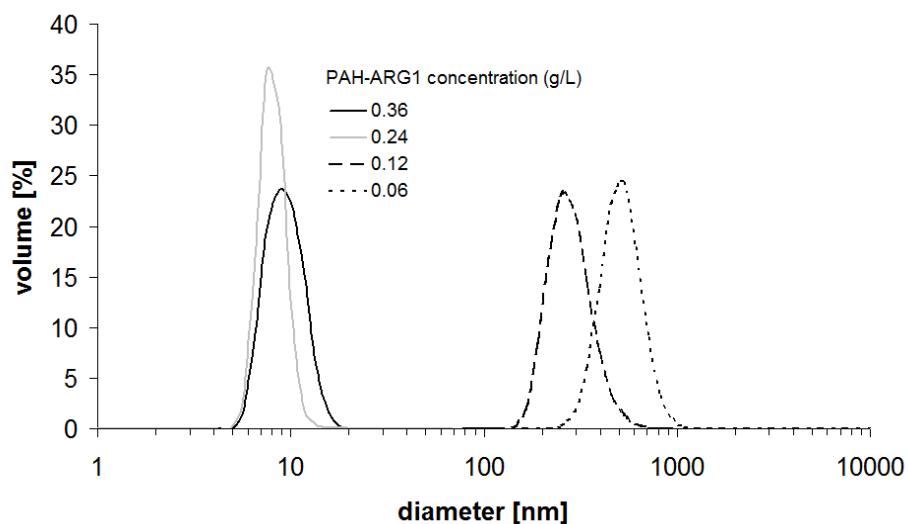**Determination of the degree of substitution (DS) of PAH derivatives**

Figure S6. The size of PAH-ARG1 aggregates formed in PBS pH=7.4 buffer solution at various polymer concentrations.
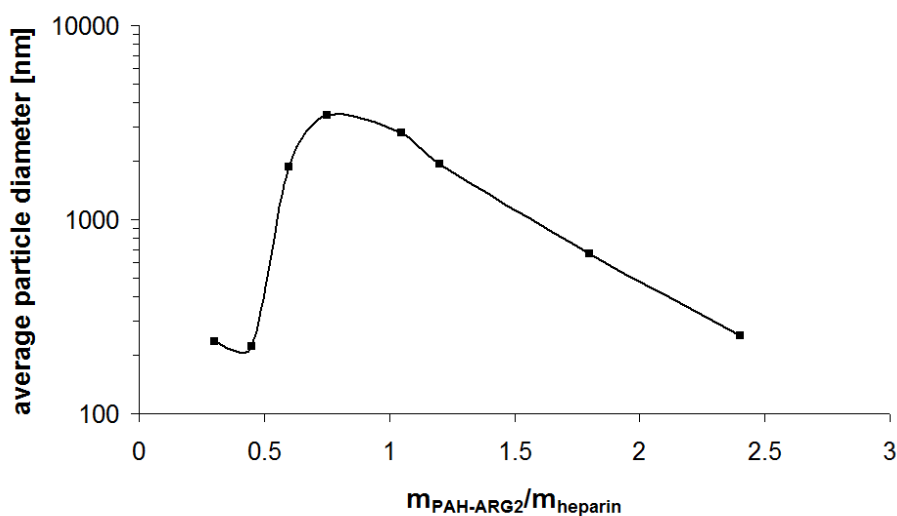

Figure S7. Dependence of the average particle size of PAH-ARG2-heparin complex and the mass ratio of polycation to polyanion. The size is strongly dependent on the value of PAH-ARG2 to heparin mass ratio. Initially, the value of the average particle diameter grows with increasing ratio of PAH-ARG2/heparin, reaching the maximum (at 0.75) and then decreases. The maximum corresponds to the system in which the zeta potential of the complex particles formed equals to zero (Figure 7). Heparin concentration was 0.4 g/l.
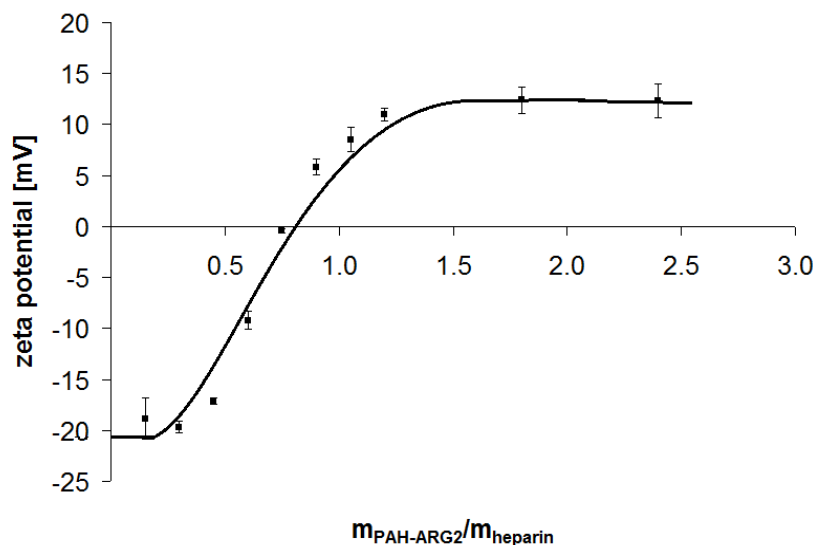
Figure S8. Dependence of the zeta potential of PAH-ARG2 -heparin complex particles on the mass ratio of polycation to polyanion. Heparin concentration was 0.4 g/l.

Table S1. Changes in the aPTT value after addition of PAH-ARG1, PAH-ARG2, and protamine sulfate to the rat blood plasma containing heparin (1 U/mL)

	aPTT (sec) for polymer/ heparin ratio							
	0	0.5	1	2.5	5	10	25	50
Protamine sulfate	180±7	184±11	97±33	120±26	50±18	21±5	18±2	26±7
PAH-ARG1	180±7	140±12	126±20	58±18	20±1	23±1	31±3	46±7
PAH-ARG2	180±7	84±22	72±29	39±5	20±2	26±2	41±3	72±23