Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Synthesis and characterization of biocompatible monotyrosine-based polymer and its interaction with DNA

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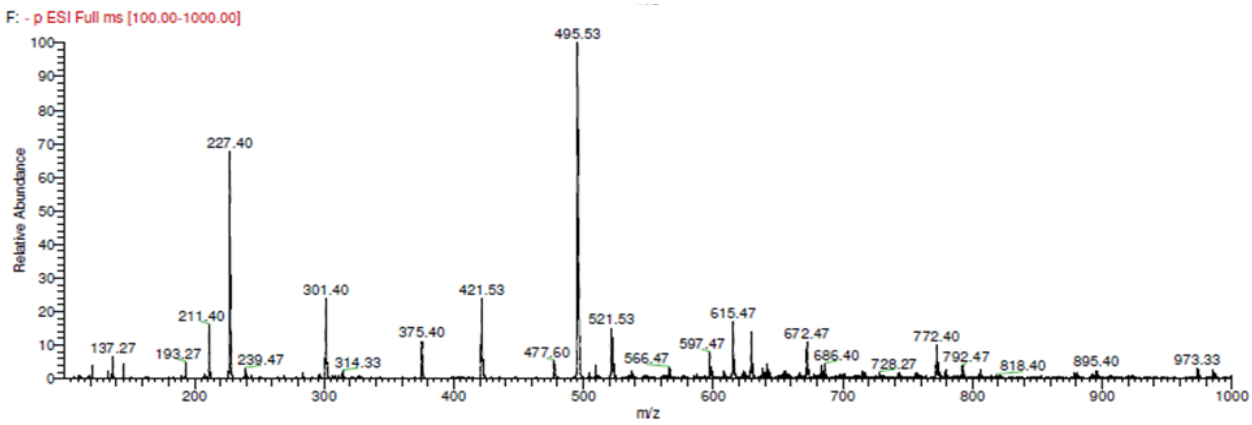

Figure S1. ESI-MS Spectra for **Bp-Ty 2**

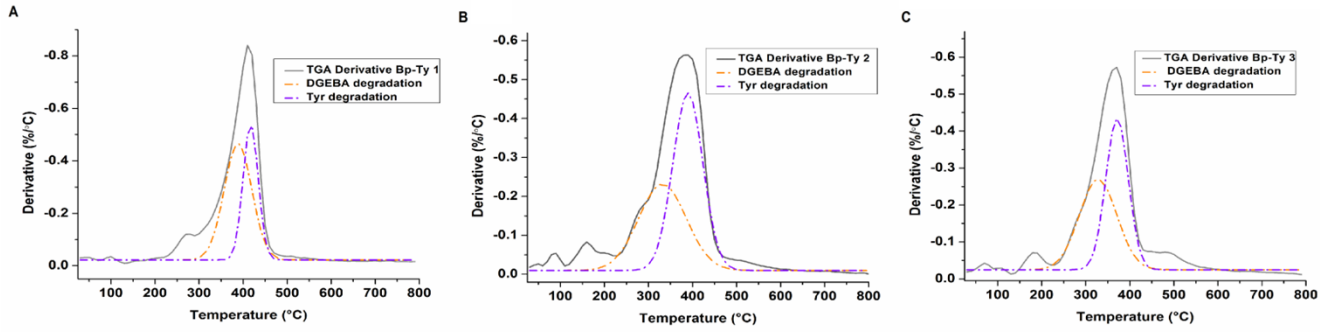

Figure S2. TGA derivative graphs deconvulated showing degradation of tyrosine and DGEBA for the synthesized **Bp-Ty** copolymers.

DIFFERENTIAL SCANNING CALORIMETRY (DSC)

The DSC plot for the DGEBA homopolymer showed the glass transition temperature, T_g, centred around 100°C as expected. Reportedly, the T_g for tyrosine homopolymer (for enzymatic polymerisation) is centred around 54-56°C. Therefore, it is expected that the DGEBA-tyrosine copolymer would denote a T_g between 55-100°C. The copolymer **Bp-Ty 2** has a T_g centred at 77°C after which the copolymer starts to melt beyond 120°C.

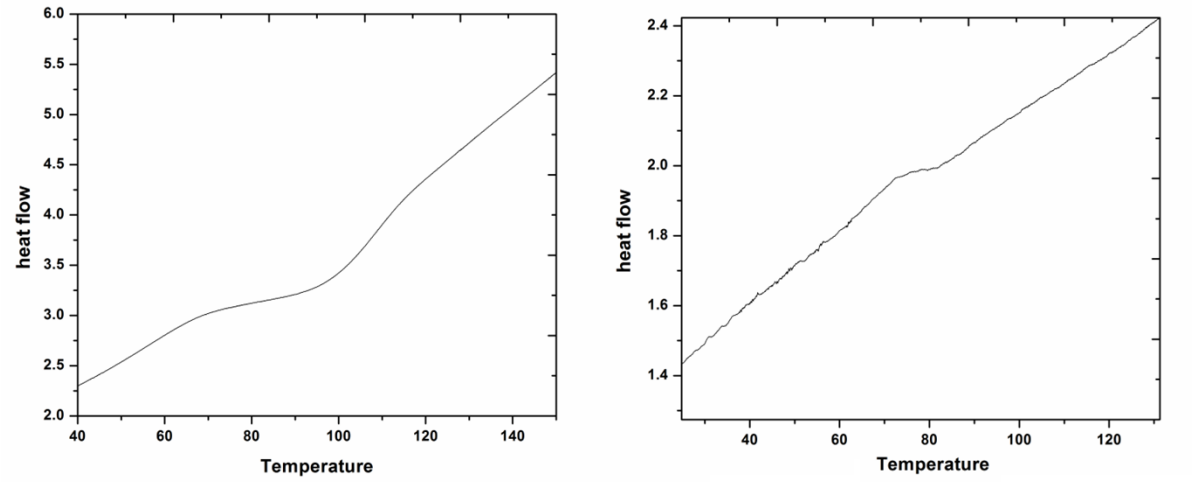

Figure S3. DSC plot for (a) DGEBA homopolymer and (b) **Bp-Ty 2.**

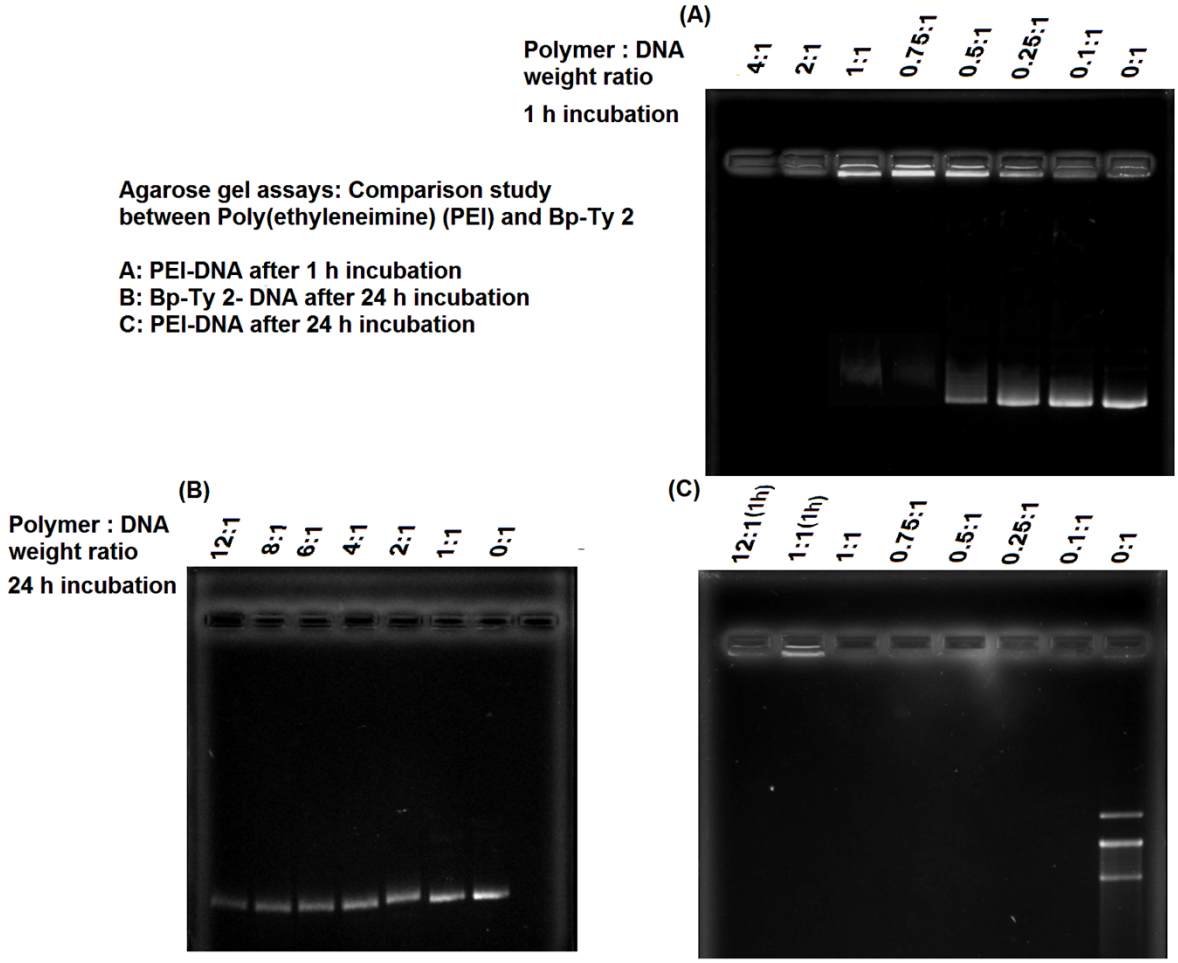

Figure S4. Agarose gel assays conducted with poly(ethyleneimine) (PEI) after 1 hour(A) and 24 hours (C) of incubation in comparison with **Bp-Ty 2** (B).

Table S1: Hydrodynamic diameter with standard deviations of DNA-polymer complexes at various concentrations after 30 min and 12 hour incubation.

DNA: Polymer ratio	Diameter after 30 minutes (nm)	Diameter after 12 hours (nm)
1:0.5	207.4±0.96	219.5±3.77
1:1	264.7±8.07	366.2±25.80
1:2	296.9±3.92	759.3±37.50
1:5	364.1±26.60	973.4±170.88
1:10	602.5±37.03	2734.7±572.10

IONIZATION OF THE POLYMER

The degree of complexation between DNA and polymer was deduced by determining the pKa of the polymer. The experiments regarding the polyplex were conducted at pH 7.0 using UV method (J. Reijenga, A. van Hoof, A. van Loon and B. Teunissen, *Anal Chem Insights* 2013**, 8**, 53.). Two distinct pKa values for the polymer, one at 7.6 and another at 11.3 were observed. Using Henderson-Hasselbalch equation, the following table was generated for the degree of ionization of the polymer.

Table S2: Table showing observed pKa of the polymer and ionization percent

S. no	pKa	pH	pKa - pH	% of anion	% of cation
1	7.6	7.0	0.6	20	80
2	11.3	7.0	4.3	0	100

Under the experimental conditions, sufficient positive charges are present on the polymer to bring about condensation of the DNA. Thus, at physiological pH of 7.4, nearly 70-80% of the polymer was ionized that initiates condensation with DNA and the formation of the polyplex which was further confirmed by gel electrophoresis, thermal melting and SEM imaging.