Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

of

Synthesis and characterization of biodegradable copolymer derived from dextrin and poly (vinyl acetate) via atom transfer radical polymerization

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Characterization techniques:

GPC analysis: The molecular weight and PDI of the Dxt-Br macroinitiators and copolymers (Dxt-g-pVAc) were determined using Gel Permeation Chromatography [Model: 2414; Make: Waters (I) Pvt. Ltd., USA; Column-STYRAGEL HR6 DMF (WAT054474) and STYRAGEL HR1 DMF (WAT044235)]. RI detector was used for GPC analysis. DMF was used as eluent at a flow rate of 0.6 mL/min at 30 °C.

FTIR analysis: FTIR spectra of dextrin, Dxt-Br 2 macroinitiator and Dxt-g-pVAc 5 copolymer were recorded using the KBr pellet method (Model IR-Perkin Elmer, Spectrum 2000). The scan range was 400 and 4000 cm^{-1}.

^{1}H NMR analysis: ^{1}H NMR spectra of dextrin, macroinitiator (Dxt-Br 2) and Dxt-g-pVAc 5 were measured on a 400 MHz (Model: Bruker spectrophotometer) using DMSO-d_6 solvent.

SEM analysis: Surface morphology of dextrin, Dxt-Br 2 macroinitiator and copolymer (Dxt-g-pVAc 5) were investigated using scanning electron microscopy (Model: S-3400N, HITACHI, Japan). Polymers were sputter-coated with gold.

AFM study: The surface topography of the Dxt-Br 2 and Dxt-g-pVAc 5 copolymer were performed using scan assist mode at atomic fluorescence microscopy (Bruker Dimension Icon Nanoscope V, Germany) with a scan range of 10μm in x-y. Sectional analysis and the roughness measurements were performed. The root mean square (r.m.s) roughness represents the standard deviation of the heights in the topographical image.

TGA analysis: Thermogravimetric analyses of dextrin, Dxt-Br 2 and the copolymer (Dxt-g-pVAc 5) were carried out with a TGA analyser (Model: STA 449F3, Netzsch, Germany) in presence of inert atmosphere of nitrogen. The heating rate was uniform (5 °C min^{-1}).

Biodegradation study:

In brief, a known amount of Dxt-g-pVAc 5 copolymer films (10 × 10× 0.1 mm^3) were immersed in phosphate buffer (pH 7.4) containing lysozyme chloride (1.5 μg/mL) at37 ± 5 °C. The media was changed every day to intact constant enzymatic activity. After regular time intervals (3, 7, 14 and 21 days), the gel like copolymers were filtered from the solution, washed with double distilled water, and dried in a vacuum oven for 72 h. Then the dried films were reweighted. The degree of *in vitro* degradation is expressed as % weight loss of the dried films vs. time.

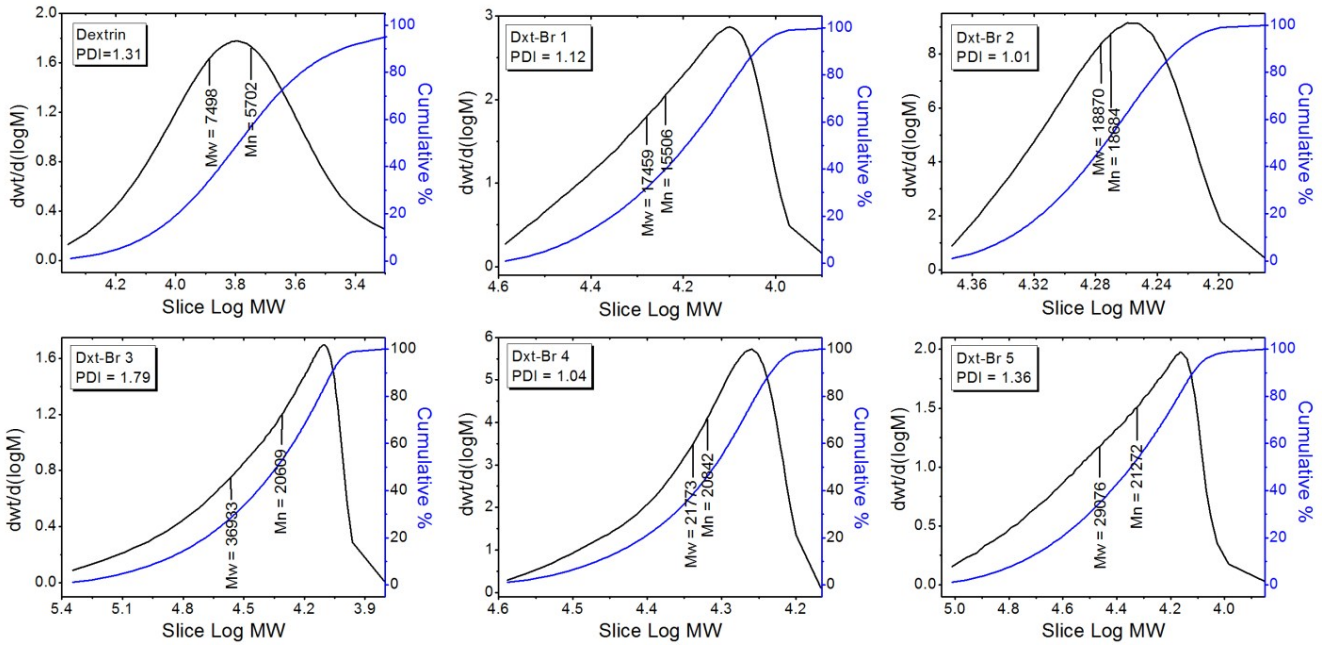


Fig. S1: GPC analyses of dextrin and various grades of Dxt-Br macroinitiators

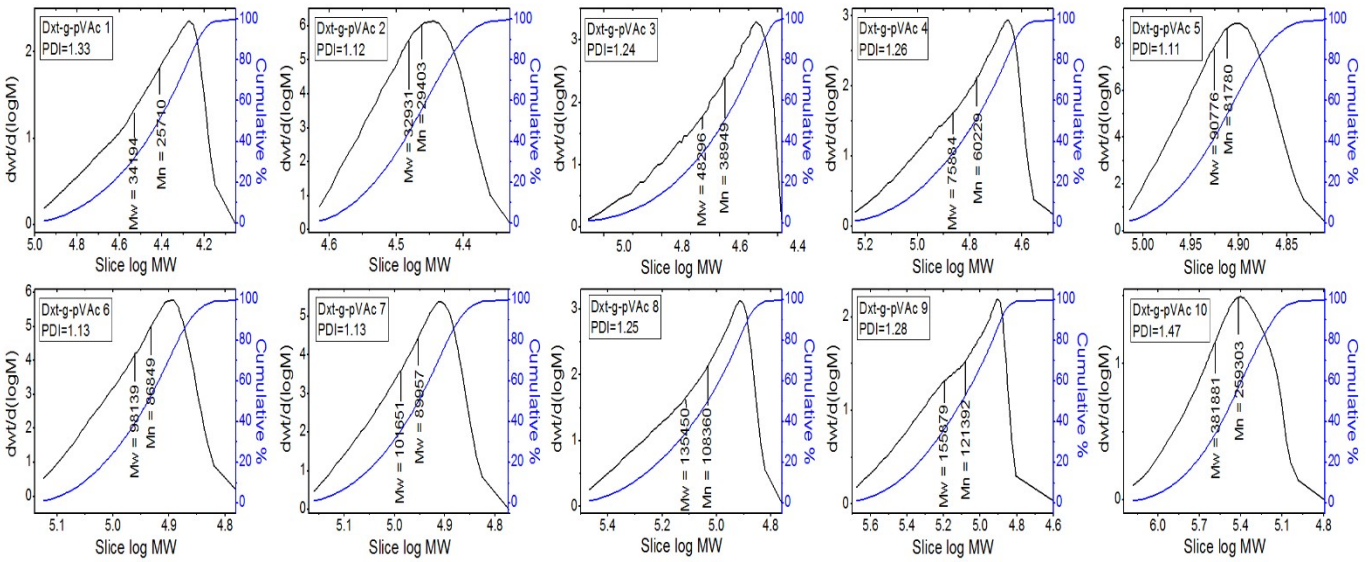


Fig. S2: GPC analyses of various grades of Dxt-g-pVAc copolymers

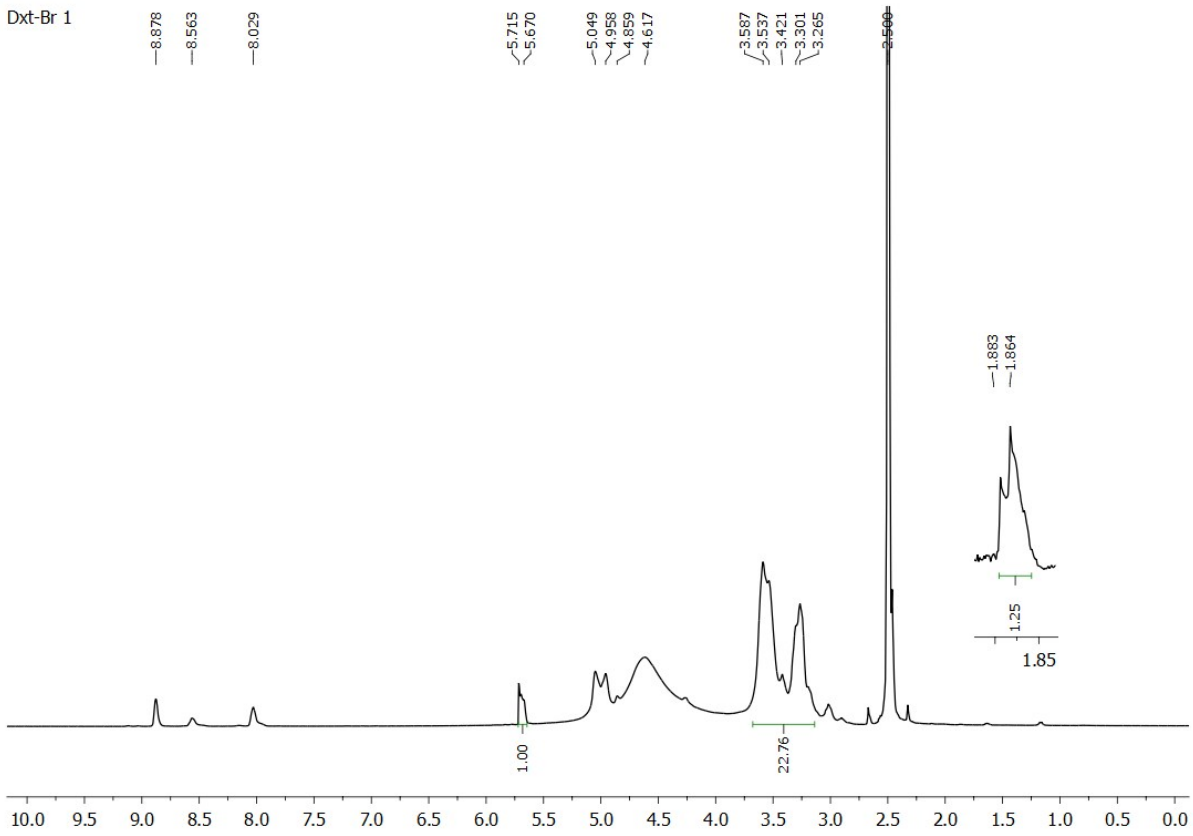


Fig. S3: ^{1}H NMR spectrum of Dxt-Br 1 macroinitiator in DMSO-d_6 solvent

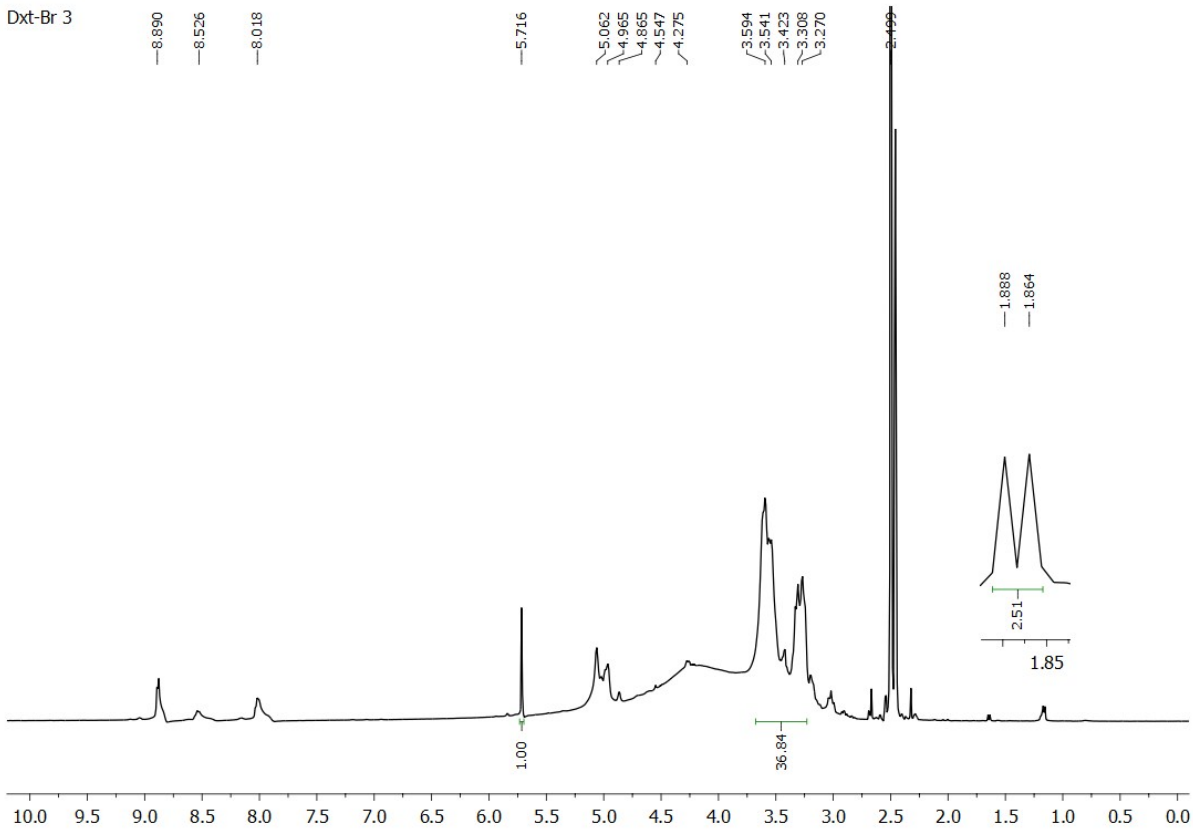


Fig. S4: ^{1}H NMR spectrum of Dxt-Br 3 macroinitiator in DMSO-d_6 solvent

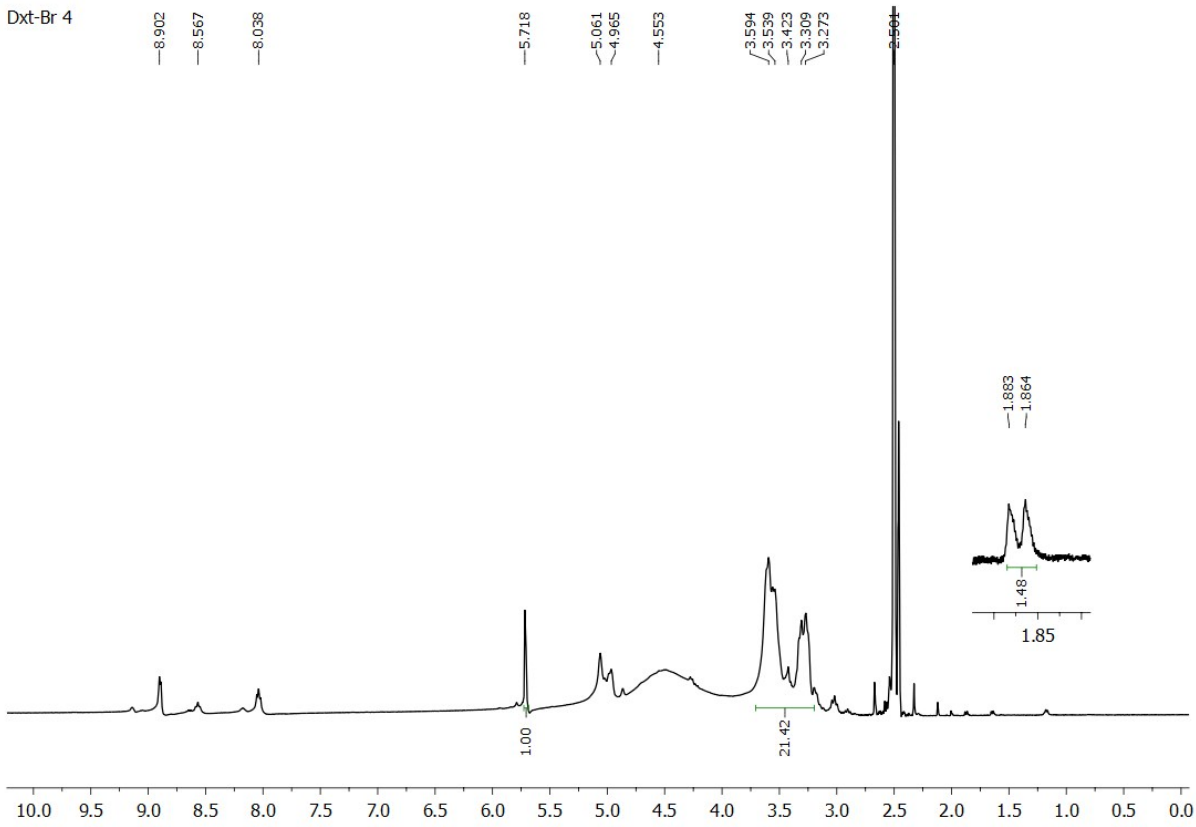


Fig. S5: ^{1}H NMR spectrum of Dxt-Br 4 macroinitiator in DMSO-d_6 solvent

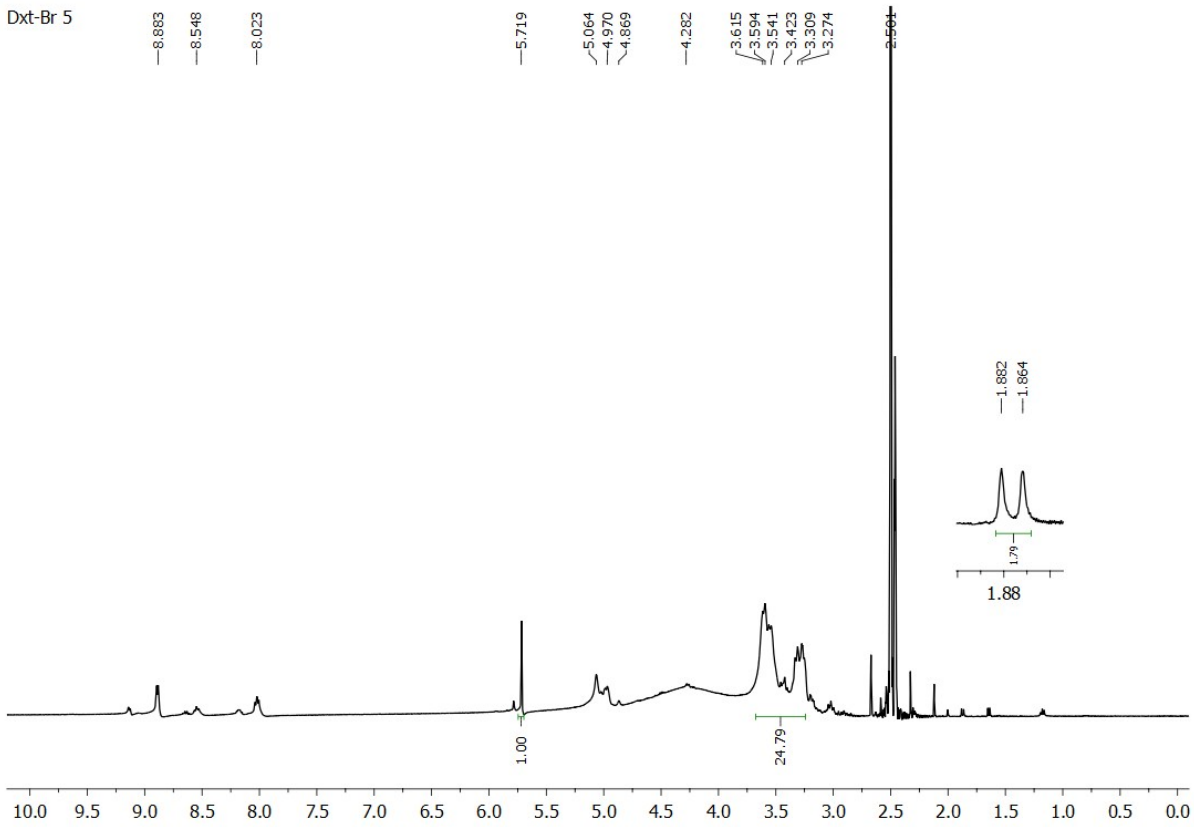
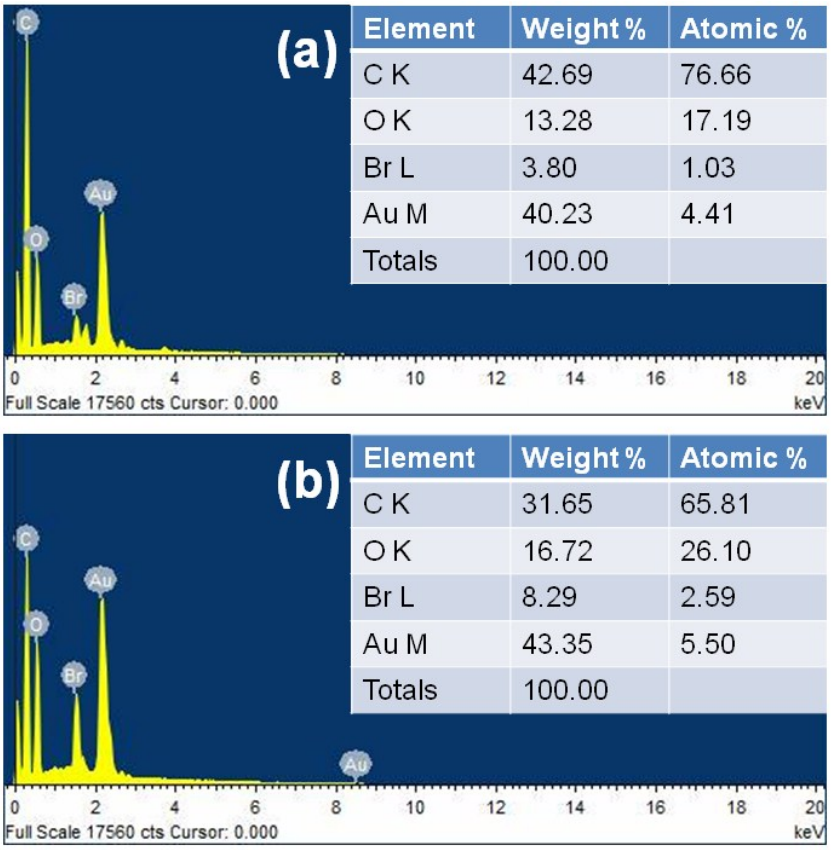


Fig. S6: ^{1}H NMR spectrum of Dxt-Br 4 macroinitiator in DMSO-d_6 solvent



Element	Weight %	Atomic %
C K	42.69	76.66
O K	13.28	17.19
Br L	3.80	1.03
Au M	40.23	4.41
Totals	100.00	

Element	Weight %	Atomic %
C K	31.65	65.81
O K	16.72	26.10
Br L	8.29	2.59
Au M	43.35	5.50
Totals	100.00	

Fig. S7: EDAX analyses of Dxt-Br 2 and Dxt-g-pVAc 5 copolymer