Supplementary Materials

1. Platinum-based Anti-cancer Drug

Cisplatin [*cis*-diammine-dichloroplatinum(II)] (CDDP) is a commonly used chemotherapeutic agent that was discovered in 1970 as an inhibitor of growth in *Escherichia coli* [1]. The *cis*-isomer was cisplatin as the causative molecule of the intriguing biological effect. The *trans*-isomer was considerably less active. There is overwhelming evidence to support the view that the major mechanism of action of cisplatin is that it becomes activated intracellularly by the aquation of the two chloride "leaving" groups, and subsequently covalently binds to DNA, forming CDDP-DNA adducts (Figure S1).

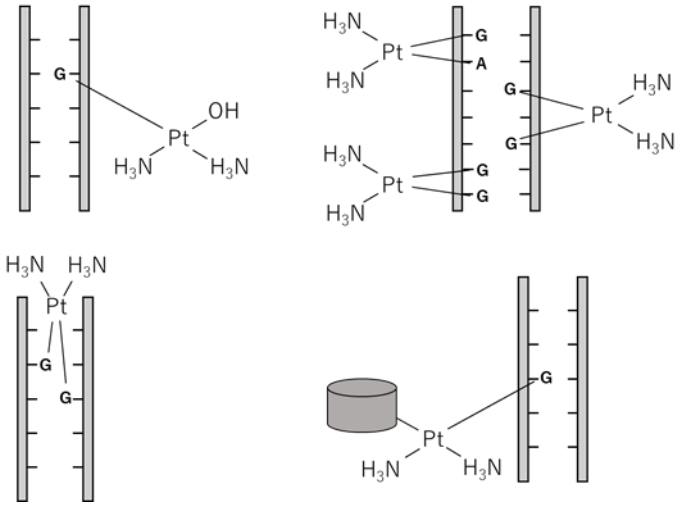

Figure S1 Platinum–DNA adducts. (a) Monoadducts, (b) intrastrand crosslinks (1,2-d(GpG) (G: guanine), 1,2-d(ApG) (A: adenine), 1,3-d(GpXpGp), where there is another base (X) in between the two platinated guanines), (c) interstrand crosslinks (G-G), and (d) DNA–protein crosslinks.

When binding to the DNA, platinating agents favor the N7 atoms of the imidazole rings of guanosine and adenosine. Three different types of lesions can form on purine bases of DNA: monoadducts, intrastrand crosslinks, and interstrand crosslinks. Monoadducts are first formed as one molecule of water is lost from aquated platinating agents; however, greater than 90% of monoadducts then react to form crosslinks. Almost all these crosslinks are intrastrand, with the majority being 1,2-d(GpG) crosslinks. Additional DNA lesions include interstrand crosslinks (G-G) and DNA-protein crosslinks (Figure S1).

There is continued debate as to which of the various platinum–DNA adducts could be the more biologically significant. The adducts cause distortions in DNA, including unwinding and bending, and are recognized by several cellular proteins, some of which are involved in DNA–repair pathways. Although the pathway(s) from platinum–DNA binding to apoptosis remains incompletely elucidated, the final cellular outcome is generally apoptotic cell death [2]. The platinum–DNA adducts can impede cellular processes, such as replication and transcription, which require DNA–strand separation to different extents. In certain cases, prolonged G2 phase cell cycle arrest occurs [3].

The porosity (Φ_p) can be measured using the following equation:

$$\phi_p = \left[l - \frac{\rho_f}{\rho_b} \right] \quad \text{(S1)},$$

where ρ_b is the mass density of bulk and ρ_f is the mass density of the corresponding electrospun fiber substrate measured by the buoyancy method using an analytical balance (AUX220, Shimadzu Ltd.) [4]. The relative density (ρ_f/ρ_b) corresponds to the density of the electrospun fiber substrate divided by the bulk density. The expected elastic modulus of the bulk substrate (E_b) is related by the following relationship as expected from the deformation model proposed by Gibson and Ashby [5]

$$E_p = E_f \left[\frac{\rho_b}{\rho_f} \right] \quad \text{(S2)},$$

where E_f is the elastic modulus of electrospun fiber substrate measured by the stress–strain curve.

To characterize fiber orientation, fast Fourier Transform was conducted using the ImageJ software by analyzing the FE-SEM images and radial summation of pixel intensities for each angle between 0 and 360° was applied to output images [6]. The summed values of the pixel intensity were plotted as a function of azimuthal angle, where the width (full width at half maximum: FWHM) is inversely proportional to the degree of orientation of the fibers. The reciprocal value of FWHW is proportional to the degree of orientation of the fibers.

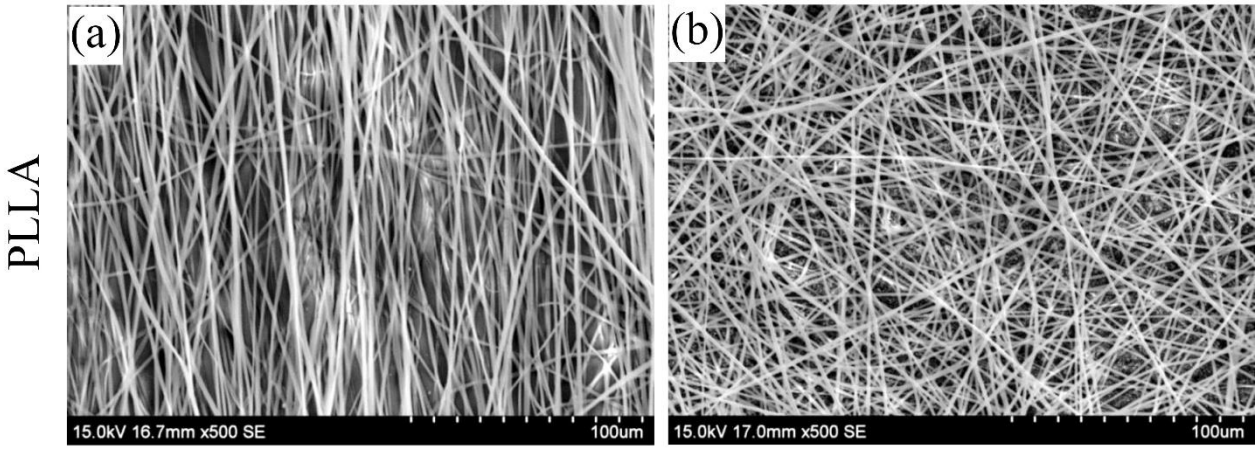

Figure S2 FE-SEM images showing electrospun fiber substrates: (a) A-PLLA and (b) R-PLLA.

Table S1 Morphological parameters, tensile properties, and degree of crystallinity of polymeric fiber-based substrates.

Substrates	Fiber diameter /μm	FWHW /°	$\Phi^{a)}$	ρ_f /g/cm^3	E_f /GPa	$E_b^{b)}$ /GPa	Fracture stress /MPa	Ultimate strain /%	Crystallinity /%
F-PLLA	-	-	-	-	-	-	-	-	-

A-PLLA	1.48 ±0.31	44.33	0.748	0.315	1.0	4.1	112	20	53.7
R-PLLA	1.54 ±0.29	-	0.712	0.360	0.61	2.1	91	78	42.8

a) Calculated from equation (S1).

b) Calculated from equation (S2).

Densities of bulk (ρ_b) PLLA was 1.25 g/cm^3.