

Supplementary Information

Role of nitrogenous bisphosphonate (local delivery) incorporated vitreous coating (with/without polymer) on surgical grade SS316L implant material to improve fixation at the damaged tissue site.

Sayantana Ray, Rituparna Acharya, Suman Saha, Amirul Islam, Sangeeta Dey, Samit Kumar Nandi, Tapan Kumar Mandal, Goutam Banerjee and Jui Chakraborty *

Determination of drug loading in the coated substrates.

The amount of drug loading in the PFBG coated SS316L substrates were calculated from the concentration difference of drug solution before and after the infiltration process^{1,2}. The concentration of drug solution was determined by spectroscopic analysis using an UV spectrophotometer (Perkin Elmer, Lambda 45, USA). Drug loading in the PFBG coated substrates with and without PLGA coating was determined from the following relationship:

$$\text{Drug loading (\%)} = [(C_1 - C_2) \times 100] / C_1 \quad (\text{Eqn. S1})$$

Where C_1 → Initial amount of the drug

C_2 → Final amount of the drug left after vacuum infiltration

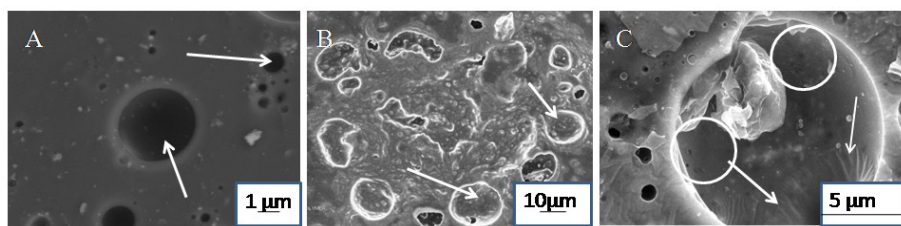


Fig. S1 A. Presence of pores in a wide variety of sizes (0.5-10 μm) (arrow marked) B. Low magnification image of PLGA coated drug incorporated PFBG coating: specific locations show dried polymer coating (arrow marked) C. PLGA coated drug incorporated PFBG coating: a closed pore coated with polymer layer (arrow marked), presence of small pores under the polymer layer (marked with circle).

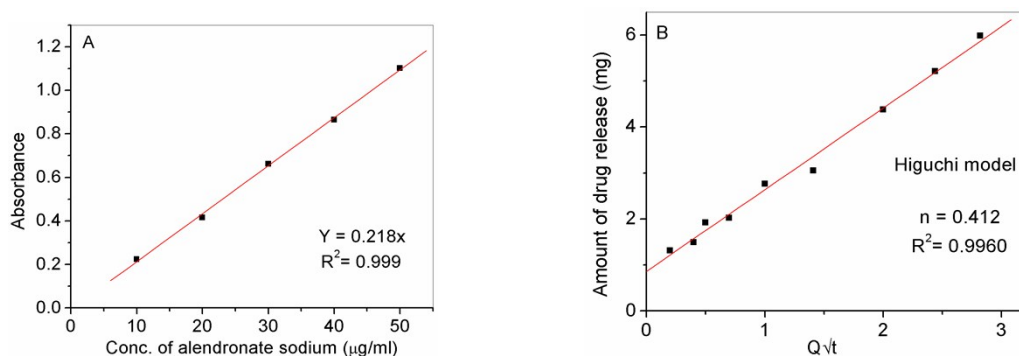


Fig. S2 A. Calibration curve of alendronate sodium drug showing a linear fit. B. Fit of the cumulative released fraction of AS from the coating as above w.r.t. the incubation time (t) following Higuchi model, without polymer and the diffusion exponent (n) value 0.412, shown in the above figure is obtained from Korsmeyer-Peppas model.

Table S1 (A-H) : List of haematological parameters, packed cell volume (PCV), total erythrocyte count (TEC), total leucocyte count (TLC), differential leucocyte count (DLC) (neutrophil, lymphocyte, monocyte, eosinophil and basophil):

A. Packed cell volume (%)

Days	Gr. I	Gr. II	Gr.III	Gr.IV
0	42.00 ± 1.25	41.70 ± 1.04	42.83 ± 1.16	42.90 ± 1.36
30	43.85 ± 1.23	43.33 ± 1.08	42.00 ± 0.70	41.00 ± 0.49
60	43.50 ± 0.85	41.33 ± 0.63	42.67 ± 0.53	41.50 ± 0.42
90	42.70 ± 0.69	43.66 ± 0.73	42.53 ± 0.70	42.50 ± 0.61

B. Total erythrocyte count ($\times 10^6/\text{mm}^3$)

Days	Gr.I	Gr.II	Gr.III	Gr.IV
0	5.34 ± 0.17	5.25 ± 0.20	5.35 ± 0.12	5.40 ± 0.22
30	5.65 ± 0.15	5.42 ± 0.17	5.48 ± 0.23	5.44 ± 0.12
60	5.56 ± 0.28	5.37 ± 0.25	5.41 ± 0.17	5.32 ± 0.22
90	5.85 ± 0.13	5.65 ± 0.11	5.43 ± 0.07	5.49 ± 0.12

C. Total leucocyte count ($\times 10^3/\text{mm}^3$)

Days	Gr.I	Gr.II	Gr.III	Gr.IV
0	6.35 ± 0.19	6.45 ± 0.12	6.43 ± 0.13	6.39 ± 0.17
30	6.36 ± 0.21	6.48 ± 0.20	6.50 ± 0.15	6.60 ± 0.13
60	6.42 ± 0.14	6.52 ± 0.17	6.66 ± 0.18	6.77 ± 0.14
90	6.37 ± 0.16	6.61 ± 0.18	6.63 ± 0.16	6.68 ± 0.07

D. Neutrophil count (%)

Days	Gr.I	Gr.II	Gr.III	Gr.IV
0	44.83 ± 1.30	43.10 ± 1.26	41.67 ± 1.29	41.57 ± 1.07
30	45.70 ± 0.96	41.33 ± 0.83	42.20 ± 1.02	43.66 ± 1.21
60	46.82 ± 1.22	41.97 ± 1.25	41.17 ± 1.12	42.65 ± 1.20
90	43.17 ± 0.87	42.20 ± 0.82	42.83 ± 0.86	43.67 ± 0.78

E. Lymphocyte count (%)

Days	Gr.I	Gr.II	Gr.III	Gr.IV
0	61.17 ± 1.22	58.04 ± 1.32	57.08 ± 1.29	58.47 ± 1.19
30	60.40 ± 0.97	61.66 ± 1.10	58.30 ± 0.96	53.15 ± 0.64
60	63.67 ± 1.35	59.73 ± 1.48	57.89 ± 0.90	52.83 ± 1.21
90	59.66 ± 0.88	58.00 ± 0.58	56.54 ± 0.09	53.01 ± 0.66

F. Monocyte count (%)

Days	Gr.I	Gr.II	Gr.III	Gr.IV
0	3.50 ± 0.44	3.83 ± 0.41	4.00 ± 0.35	3.80 ± 0.15
30	3.20 ± 0.42	3.16 ± 0.35	4.19 ± 0.40	3.95 ± 0.30
60	2.95 ± 0.31	3.05 ± 0.29	3.90 ± 0.1	4.16 ± 0.20
90	3.65 ± 0.33	3.56 ± 0.30	3.70 ± 0.24	3.76 ± 0.26

G. Eosinophil count (%)

Days	Gr.I	Gr.II	Gr.III	Gr.IV
0	1.85 ± 0.39	1.86 ± 0.30	1.92 ± 0.12	2.00 ± 0.20
30	1.63 ± 0.49	1.80 ± 0.20	2.10 ± 0.31	1.94 ± 0.40
60	1.90 ± 0.32	1.81 ± 0.34	1.60 ± 0.26	2.10 ± 0.30
90	2.00 ± 0.30	1.98 ± 0.19	1.80 ± 0.08	1.90 ± 0.10

H. Basophil count (%)

Days	Gr.I	Gr.II	Gr.III	Gr.IV
0	0.33 ± 0.21	0.17 ± 0.10	0.33 ± 0.18	0.50 ± 0.09
30	0.36 ± 0.23	0.43 ± 0.23	0.45 ± 0.16	0.30 ± 0.22
60	0.45 ± 0.25	0.40 ± 0.21	0.50 ± 0.22	0.34 ± 0.11
90	0.50 ± 0.22	0.50 ± 0.20	0.45 ± 0.04	0.43 ± 0.09

References:

- 1.Chakraborty J, Sengupta S, Ray S, Ghosh S, Kapoor R, Gouri SP, Pande G, Datta S. Multifunctional gradient coatings of phosphate-free bioactive glass on SS316L biomedical implant materials for improved fixation. *Surf Coat Tech* 2014;240:437–443.
- 2.Soundrapandian C, Basu D, Sa B, Datta S. Local drug delivery system for the treatment of osteomyelitis: *In vitro* evaluation. *Drug Dev Ind Pharm* 2011;37:538–546.
3. Dash S, Murthy PN, Nath L, Chowdhury P. Kinetic modelling on drug release from controlled drug delivery systems. *Acta Poloniae Pharma Drug Res* 2010;67:217-223.