

Electronic Supplementary Information (ESI)

Electrically bioactive coating on Ti with bi-layered SnO₂-TiO₂ hetero-structure for improving osteointegration

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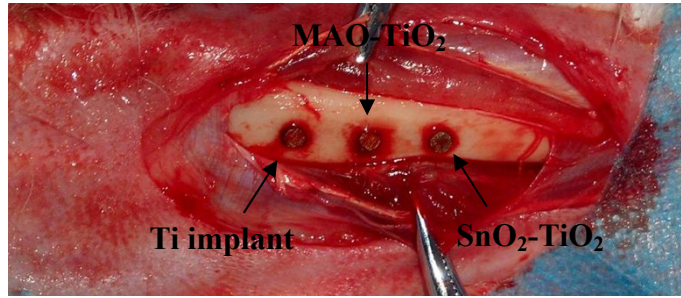


Fig. S1 Image of implants placed tibia during animal surgery.

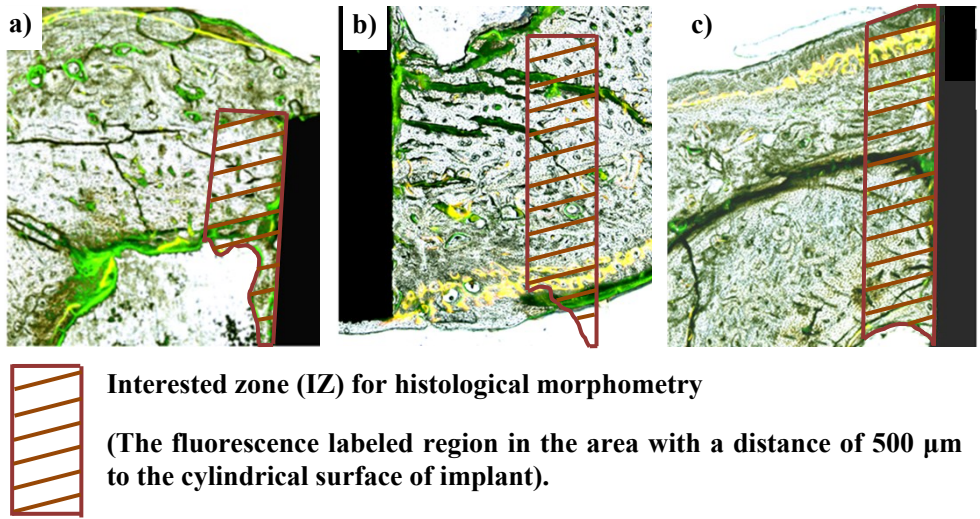


Fig. S2 Schematic diagram for the histological morphometry of the histological images with fluorescence labeling: (a) Ti implant, (b) MAO-TiO₂, and (c) SnO₂-TiO₂.

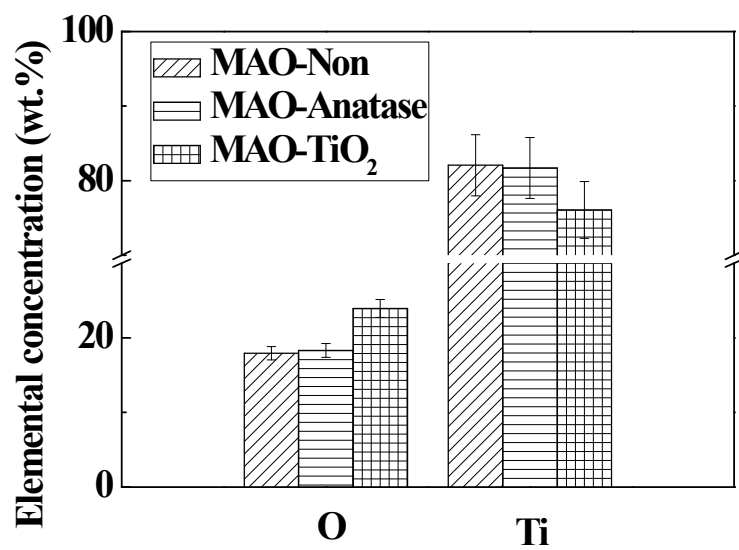


Fig. S3 Surface elemental concentration of the MAO coated samples.

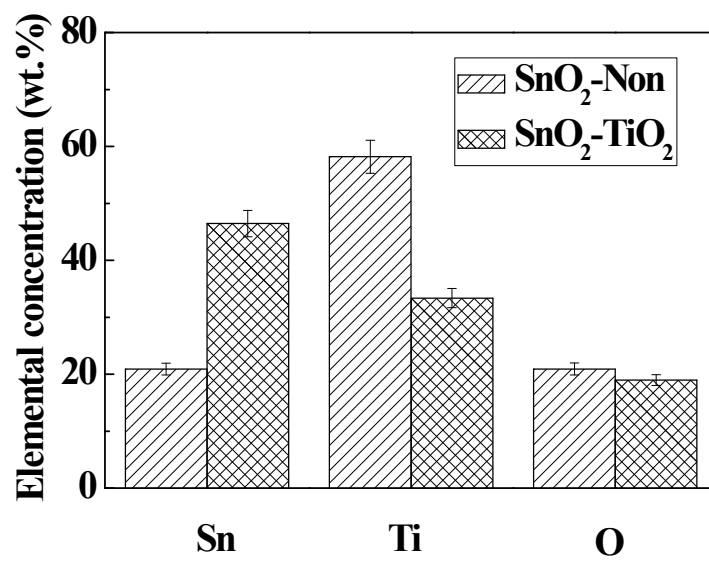


Fig. S4 Surface elemental concentration of the SnO₂-Non and SnO₂-TiO₂.

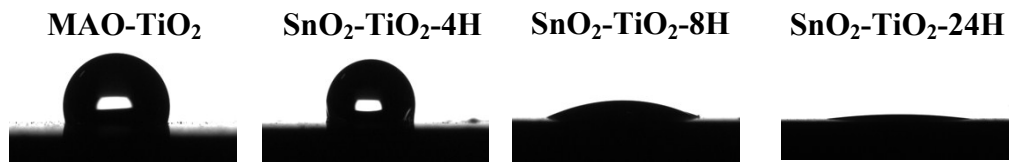


Fig.S5 The CAs of SnO₂-TiO₂ surface with different soaking time during the hydrothermal treatment.

Table S1. Sample code based on phase composition from XRD results.

| Sample code | Phase composition | Treatment |
|------------------------------------|----------------------------------------------|---------------------------------------|
| MAO-Non | Amorphous TiO _x | MAO at 250 V |
| MAO-Anatase | Anatase | MAO at 350 V |
| MAO-TiO ₂ | TiO ₂ (Anatase+Rutile) | MAO at 450 V |
| SnO ₂ -Non | SnO ₂ +Amorphous TiO _x | MAO at 250 V + Hydrothermal treatment |
| SnO ₂ -Anatase | SnO ₂ +Anatase | MAO at 350 V + Hydrothermal treatment |
| SnO ₂ -TiO ₂ | SnO ₂ +TiO ₂ | MAO at 450 V + Hydrothermal treatment |

Table S2. Comparison of enhancement in push out test of the implant fabricated by different modified strategies.

| Strategy | Preparation method | Mechanical testing method | Control groups | Healing time | Enhancement | Ref. |
|------------------------------------------|---------------------------------------------|---------------------------|----------------------------|--------------|----------------------|------------|
| Nano-topographic stimulation | Acid etch | Push-out force | Ti | 12 weeks | 2 times | 52 |
| Nano-topographic & Chemical stimulation | Anodizing & Drug laden | Push-shear bond strength | Ti-32Nb-5Zr | 4 weeks | 7 times | 53 |
| Micro-topographic & Chemical stimulation | Microarc oxidation & HA deposition | Pull-out tests | Microarc oxidized Ti | 4 weeks | 2 times | 54 |
| Modulus matching | Low modulus alloy | Push-in test | Ti | 4 weeks | 0.9 times | 55 |
| Nano-topographic & Chemical stimulation | Anodizing & ions doping | Pull-out test | Ti | 12 weeks | 4 times | 56 |
| Electric & Nano-topographic stimulation | Microarc oxidation & Hydrothermal treatment | Push-out force | Ti Microarc oxidized Ti | 4 weeks | 7 times 2.5 times | This study |