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Supporting Information

Dopamine Surface Modification of Trititanate Nanotubes: Proposed In-Situ Structure Models

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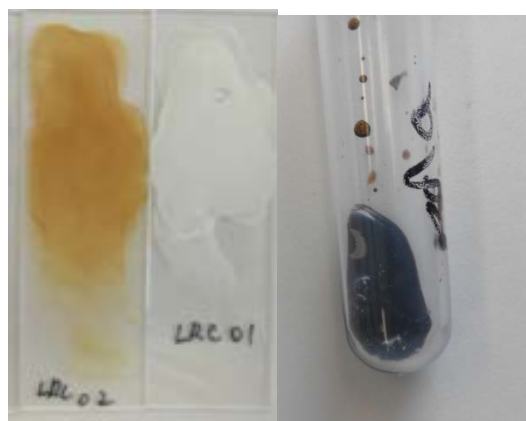
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Figure S1. Photo of TiNT-dopamine, left, and TiNT, middle, showing colour change upon dopamine functionalization. On the right is synthesized pda.

Using FTIR spectroscopy we have proposed that dopamine attaches to the nanotube surface through the OH groups, as can be seen in Figure S2, by the disappearance of the OH bending mode at 1340 cm^{-1}, however due to the low concentration (%) of dopamine on the surface this is not entirely conclusive. The -OH bending mode (650 -770 cm^{-1}) is also not observed after functionalization, however this is once again not conclusive. The C-H bending at 1500 cm^{-1} and the aryl oxygen stretching at 1280 cm^{-1} are still visible after binding to the Ti surface. The spectra of unmodified TiNT contain two absorption bands: a broad band (3700 – 2600 cm^{-1}) characteristic of OH groups linked to surface Ti atoms, and a narrow band at 1620 cm^{-1}, associated with the scissoring vibration of adsorbed water molecules.
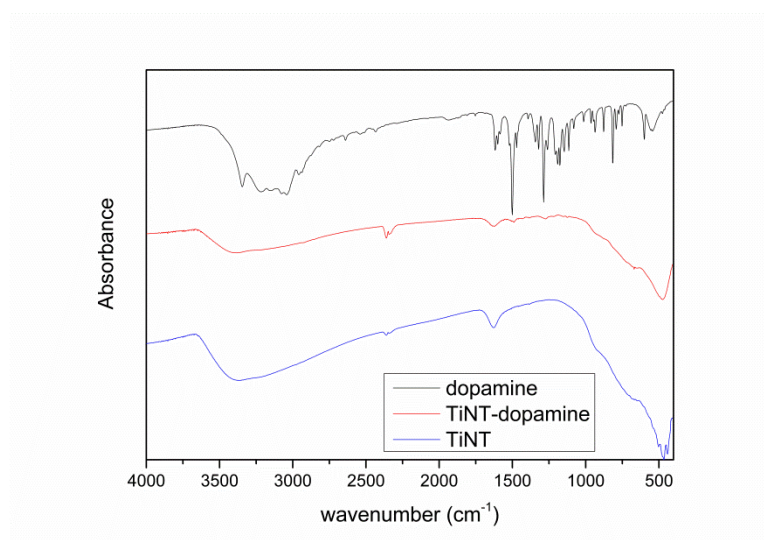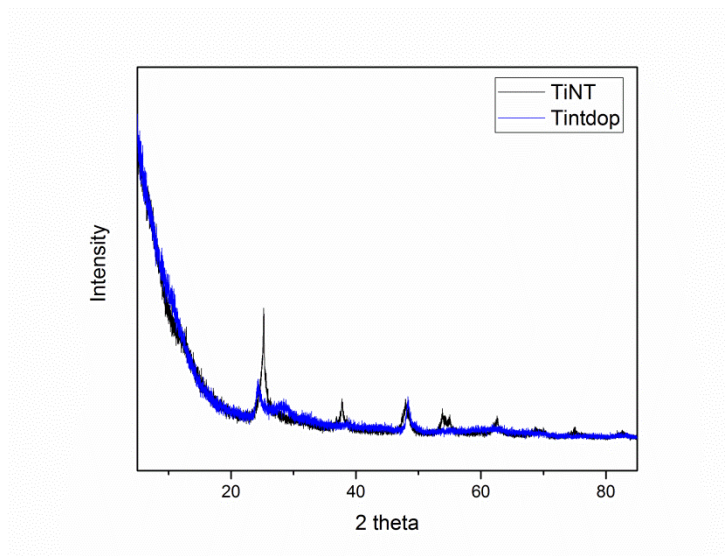

Figure S2 FTIR

Figure S3 Powder X-Ray diffraction pattern of TINT and TiNT-dopamine from 5- 85 dergrees.

Thermogravametric analysis was performed on both TiNT and TiNT-dopamine, as shown in Figure S4. In Figure 4 a the TiNT lost surface water up to 150 ^{o}C, then water on the internal nanotube surfaces until 300 ^{o}C for a total loss of 11%. TiNT-dopamine had an additional loss from 300 to 600 ^{o}C of 3 wt%, which is attributed to dopamine on the nanotube surface.
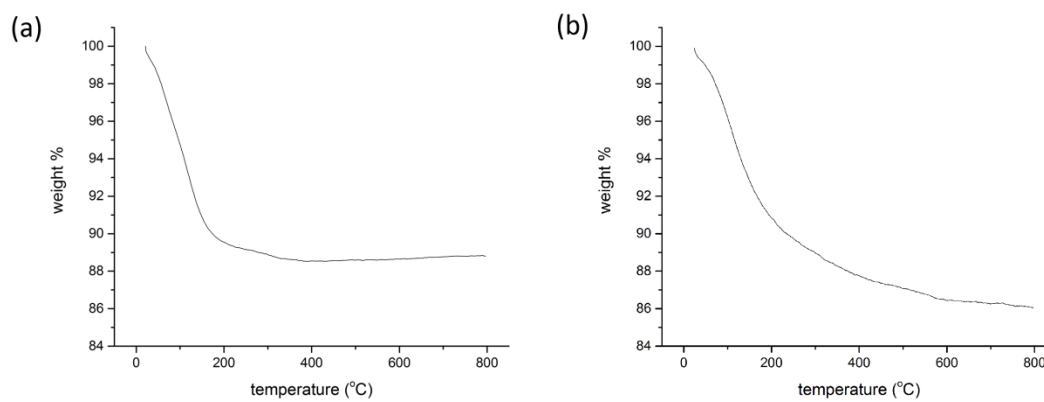
(a)   (b)

Figure S4 TGA curves of (a) TiNT (11% of weight lost) and (b) TiNT-dopamine (14% weight lost)
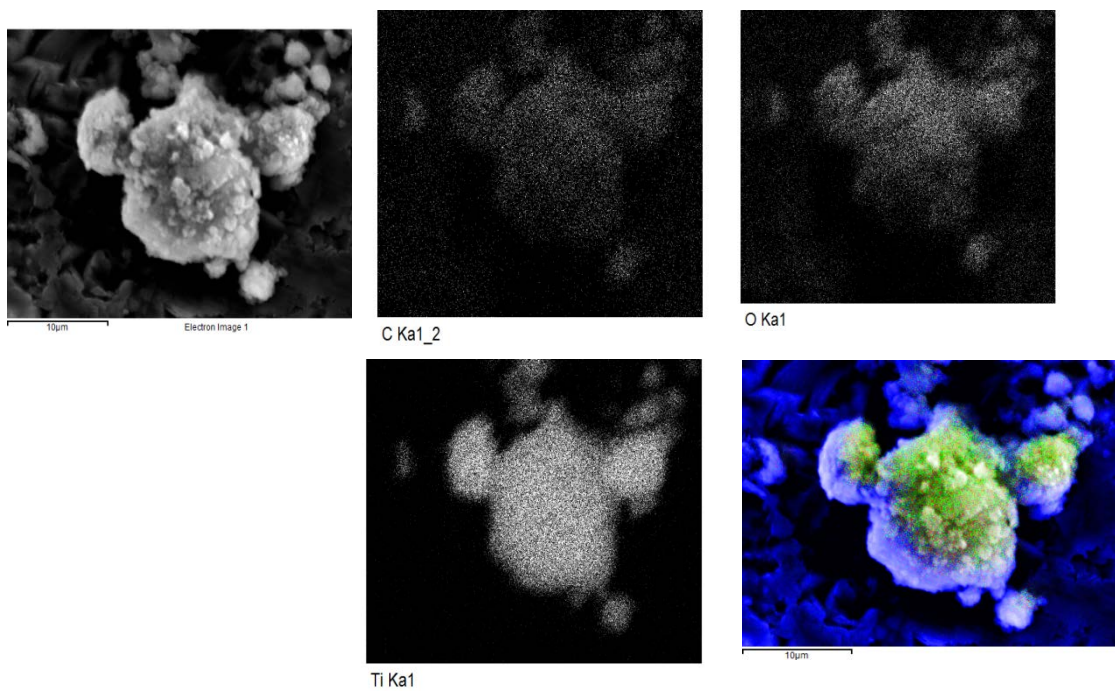
C Ka1_2

O Ka1

Ti Ka1

Figure S5 SEM EDX map of TiNT-dopamine aggregated particle. Coloured image: green: oxygen, red: carbon, white: titanium, blue: Si (background sample on Si wafer)
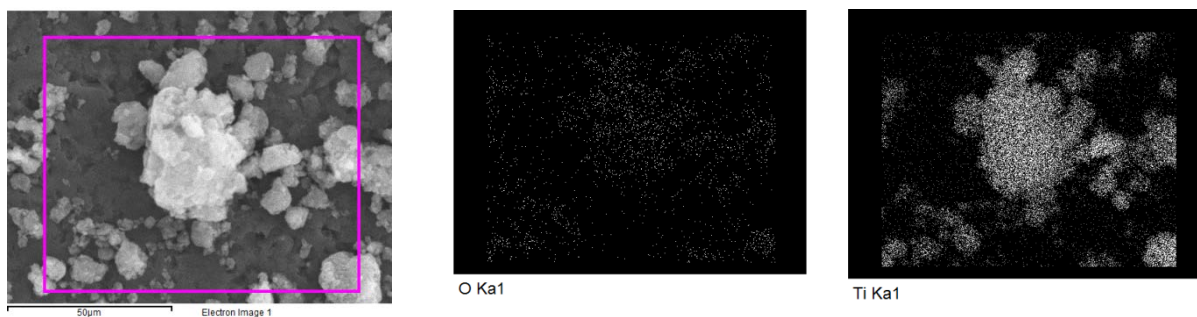

O Ka1

Ti Ka1
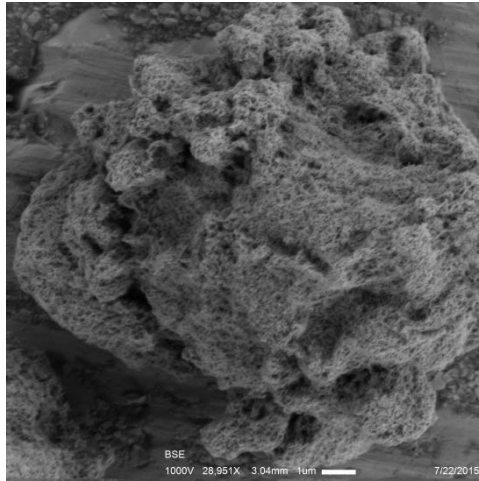
Figure S6 SEM EDX map of TiNT aggregated particle. C signal not detected.

Figure S7 FE-SEM image of TiNT-dopamine aggregate