Supporting Information

for

# Detonation nanodiamonds biofunctionalization and immobilization to titanium alloy surfaces as first steps towards medical application

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## Physisorption Test

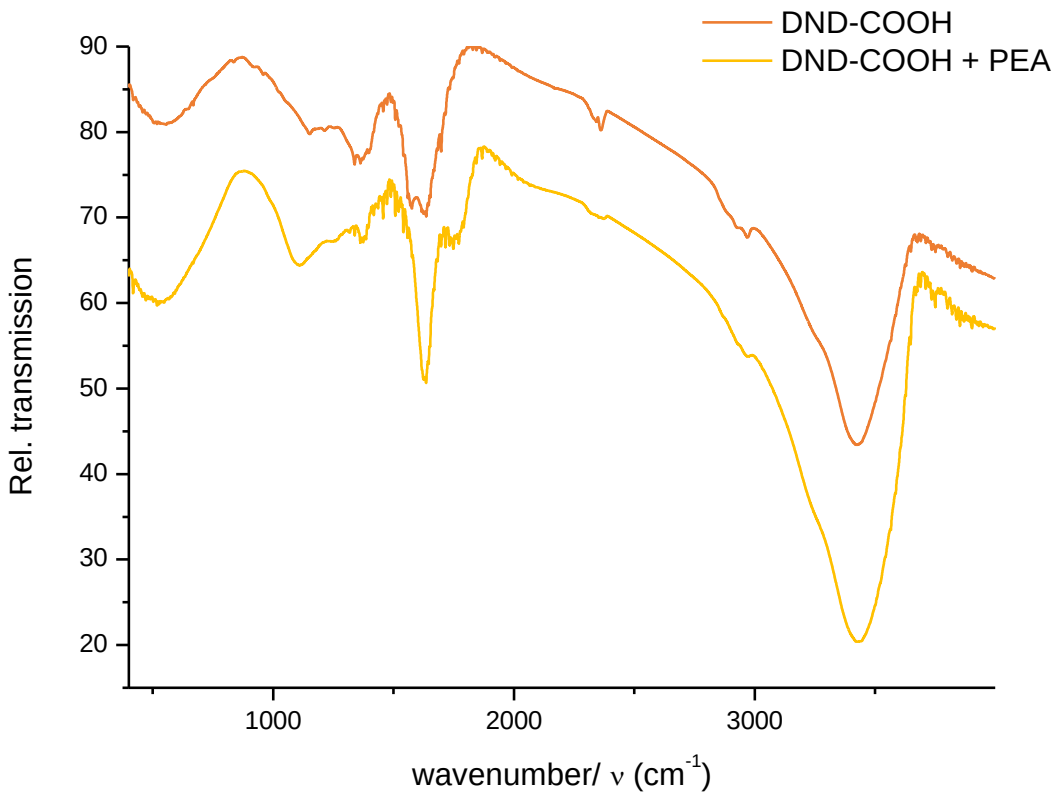


**Figure S1:** Physisorption test was carried out on carboxylic DND with *O*-PEA: An aqueous solution (10 mL) of 200 mg carboxilated DND **2** was allowed to react with *O*-PEA (8% aqueous solution) for 2.5 h, at room temperature. Both products were compared by FTIR. After the incubation time there is no signal form the *O*-PEA in the final product, indicating that no physisorption occurred.

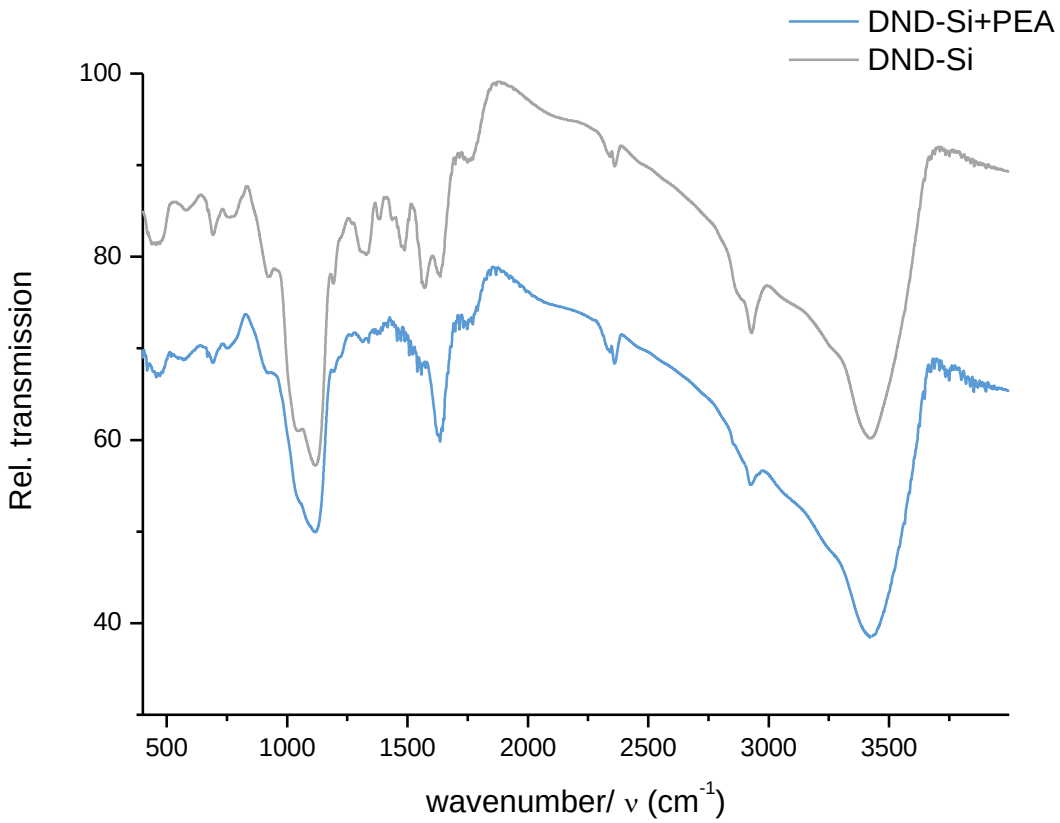


**Figure S2:** Physisorption test was carried out on silanized DND with *O*-PEA: An dichloromethane solution of 200 mg of silanized DND **5** and 80 mg of *O*-PEA, was allowed to react for 65 h, at room temperature. Both products were compared by FTIR. After the incubation time there is no signal from the *O*-PEA in the final product, indicating that no physisorption occurred.

**Table S1:** Characteristic absorption bands of species analyzed by infrared spectroscopy, Figure 2 and 3 [1,2].

| DND<br>**1** | DND-COOH<br>**2** | DND-CO-PEA<br>**3** | DND-OH<br>**4** | DND-APTMS<br>**5** | DND-APTMS-PEA<br>**6** | *O*-PEA | *Characteristic absorption* |
|---|---|---|---|---|---|---|---|
| | | 515 $cm^{-1}$ | | | 535 $cm^{-1}$ | 525 $cm^{-1}$ | |
| | | | | 690 $cm^{-1}$ | 570 $cm^{-1}$ | 565 $cm^{-1}$ | |
| | | 750 $cm^{-1}$ | | | 775 $cm^{-1}$ | 760 $cm^{-1}$ | |
| | | 930 $cm^{-1}$ | | 925 $cm^{-1}$ | 940 $cm^{-1}$ | 943 $cm^{-1}$ | $\delta_{NH2}$ |
| | | 1030 $cm^{-1}$ | | 1050 $cm^{-1}$ | 1025 $cm^{-1}$ | 1025 $cm^{-1}$ | Si-OR |
| | | 1106 | | | 1100 $cm^{-1}$ | 1085 $cm^{-1}$ | Phosphate |
| 1110 $cm^{-1}$ | 1150 $cm^{-1}$ | 1070 | 1170 - 1120 $cm^{-1}$ | 1120 $cm^{-1}$ | 1150 $cm^{-1}$ | 1155 $cm^{-1}$ | $\nu_{C-O}$ |
| 1220 $cm^{-1}$ | | | 1210 $cm^{-1}$ | | 1250 $cm^{-1}$ | 1250 $cm^{-1}$ | |
| | 1340 $cm^{-1}$ | | 1370 $cm^{-1}$ | 1320 $cm^{-1}$ | | | $\delta_{C-O.H}$ |
| | 1570 cm | 1500 $cm^{-1}$ | | 1480 $cm^{-1}$ | 1560 $cm^{-1}$ | 1556 $cm^{-1}$ | $NH_2$ scissoring |
| 1620 $cm^{-1}$ | 1630 $cm^{-1}$ | | 1630 $cm^{-1}$ | 1638 $cm^{-1}$ | 1638 $cm^{-1}$ | 1630 $cm^{-1}$ | $\nu_{C=O}$ |
| 1735 $cm^{-1}$ | | | 1755 $cm^{-1}$ | | | 2110 $cm^{-1}$ | O-H stretching |
| | | | | | 2640 $cm^{-1}$ | 2640 $cm^{-1}$ | $\nu_{Alkanes}$ |
| | | | | | 2694 $cm^{-1}$ | 2900 $cm^{-1}$ | |
| 2934 $cm^{-1}$ | 2970 $cm^{-1}$ | 2930 $cm^{-1}$ | 2920 $cm^{-1}$ | 2930 $cm^{-1}$ | 2910 $cm^{-1}$ | 2990 $cm^{-1}$ | |
| 3415 $cm^{-1}$ | 3420 $cm^{-1}$ | | 3410 $cm^{-1}$ | 3420 $cm^{-1}$ | 3430 $cm^{-1}$ | | OH |

# References


1. Coates, Interpretation of Infrared Spectra, A Practical Approach. In: *J. Encycl. Anal. Chem.,* Ed, John Wiley & Sons: Chichester, 2000
2. Gong, W. *Int. J. Miner. Process.* **2001,** *63,* 147–165.