COD.XPSING11

REPORT ON THE XPS ANALYSIS OF A TITANMED DENTAL IMPLANT

Reference: D.d.t. TITANMED srl

Our Reference: *0991000440*

Evaluation by:

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XPS ANALYSIS ON DENTAL IMPLANTS

Summary.

Two Titanmed dental implants have been tested to establish their surface chemical composition. The data show the presence of sandblast waste, highlighted by the Al indication.

Materials and Methods.

The implants which are under investigation are described in the above mentioned Reference. The surface chemical composition of the samples has been evaluated by XPS (X-ray Photoelectron Spectroscopy) analysis or ESCA (Electron Spectroscopy for Chemical Analysis. Both These names, which indicate the same technique, are used in scientific literature about it). This kind of technique allows to get the qualitative and quantitative composition of the most external layers of the material (in case of metals, the analyzed depth is of about 5 nanometer (nm)) and therefore gives a direct indication of the chemical composition of the material layers which indeed come into contact with the bone tissue.

The XPS analysis has been performed with a Perkin Elmer PHI 5400 ESCA System tool. It has an X-ray source with Mg anode, kept at 20kV with a power of 200 W. The analyzed depth is of about 5 nm. The pressure inside the analytic chamber has been kept at about 10-9 Torr. The analysis result is expressed in atomic %. The samples have been drawn out of their packaging when the analysis began, no preparation treatment has been done.

Results

The XPS analysis of the implants has given the following results, the spectra are recorded on the following page:

Surface Composition (% at.)

Sample	O	Ti	N	Ca	C	Si	S	Na
1	37.4	13.9	0.7	0.6	44.7	1.1	0.1	0.6
2	38.4	13.8	0.8	0.8	44.2	1.3		0.7

The obtained results show a good superficial cleaning degree for both the analyzed samples. In particular, the Ti signal is quite high and the absolute value of the concentration agrees with what expected for cleaned surfaces. The carbon value and consequently the C/Ti ratio are surely acceptable and do not show a significant organic contamination presence. As are sandblasted samples, it is important to notice the total absence of Al, thing that confirms that sandblast waste has been effectively removed. As per the remaining observed elements, as per quality and quantity they are surely adequate to law as far as what can be identified on the same usage destination materials in commerce.

Conclusions.

Based on the previous data, the performed analyses have shown a satisfactory superficial composition, characterized by a good absolute value of Ti and an adequate C/Ti ratio. In conclusion, at the end of the working procedures and of the cleaning steps and packaging, these implants surface is in adequate condition for their usage, according to the field literature confirmation and to the comparison with similar system in clinical usage.

XPS Survey
EV/Step: 1 eV, Time/Step: 30 mSec, Sweeps: 50
Source: Mg, Pass Energy: 178.95 eV, Work Function: 0 eV

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