

Referee 1

The quality of the presentation in the paper by Vokoun et al., ID coatings-876255 is rather poor. Some problems may just be related to semantics, but the readability definitely suffers from that. The questionable issues can be described as follows:

1. The abstract is not written very appropriately. It is, at first, too detailed and, secondly, does not meet the required style. An abstract to a scientific paper should, in principle, present in a most concise manner both goals and results of the particular study. However, the authors have, for instance, written in the Abstract, that „NiTi films were kept at 300 deg. C for about 45 minutes (Pt 100 ALD cycles) and 90 minutes (Pt 200 ALD cycles) resulting in a moderate NiTi grain growth (Pt 100 ALD cycles) and an increase of the M_s transformation temperature by 14°C (both Pt 100 and 200 ALD cycles).“ At first, the exact amounts of the minutes and ALD cycles are not to be considered as possible data. These data can possibly not be generalized, they are reactor-dependent.

The abstract was rewritten as follows: “Pt coatings on NiTi film micro-actuators and/or sensors can add some useful properties, e.g. they may improve the NiTi anticorrosion and thermomechanical characteristics or activate surface properties beneficial for a specific application (e.g. functionalized surfaces for biomedical applications). Pt coatings prepared via atomic layer deposition (ALD) may help reduce cost due to the nanometric thickness. However, no authors have reported preparation of Pt ALD coatings on NiTi films, perhaps due to the challenge of the concurrent NiTi film oxidation during the Pt ALD process. In the present study, Al_2O_3 and Pt ALD coatings were applied to NiTi thin films. The ALD coating properties were studied using electron and atomic force microscopies and X-ray photoelectron spectroscopy (XPS). Potential structural changes of NiTi due to the ALD process were evaluated using electron microscopy and X-ray diffraction. The presented ALD process resulted in well-controllable preparation of Pt nanoparticles on ultrathin Al_2O_3 seed layer and a change of the transformation temperatures of the NiTi films.“

The previous details were omitted or mentioned in part 2.2.

2. What is this M_s ? This appears in Section 2.4 in row 155, without any explanation and opening the meaning of M_s for a reader. At the same time, it seems that M_s (whatever it may be) is the only physical quantity which can be linked to shape memory properties of NiTi substrates, is this correct?

Yes, M_s can be linked to shape memory properties of NiTi. M_s is omitted in the abstract in order not to confuse potential readers. M_s (of NiTi) is explained in the introduction part.

3. It is said that the M_s transformation temperatures were determined using XRD. However, there are no diffractograms presented in this manuscript. Instead, there are lot of data obtained by AFM and XPS, which seems to be relatively less important compared to XRD.

The determination of M_s of the NiTi films using XRD is described in a recent paper [Vokoun et al. Effect of FIB milling on NiTi films and NiTi/Si micro-bridge sensor, Smart Mater and Struct, 2020] (films from the same producer as those used in the present manuscript). Also diffractograms are shown in this cited paper. This is why no diffractograms are shown in the

manuscript but reference [Vokoun et al. Effect of FIB milling on NiTi films and NiTi/Si micro-bridge sensor, Smart Mater and Struct, 2020] is given in the manuscript.

4. What is the acronym RUS in the Table 3 ?

RUS = Resonance Ultrasound Spectroscopy. The acronym was replaced by the full name of the method.

5. The authors have written in rows 40-41, that „When the ALD is applied to coat NiTi alloys, then the deposition temperature (substrate temperature, or specifically, temperature at the NiTi surface) is often a concern.“ What is meant by the word „often“ here?

The referee is right that word “often“ is not appropriate. Word “often“ in 40-41 was omitted.

6. The authors have written in rows 43-44, that „an advantage of the ALD process is low temperature deposition for a large number of precursors [10-12]“ Do these three references 10-12 really describe exploitation of a „large“ number of precursors?

The referee is right. The sentence was rewritten as follows: „Although some ALD processes can take place at low deposition temperature [10-12], unfortunately this is not the case for any Pt ALD process applied to NiTi.“

7. The authors tell a reader, within rows 45-50, about the importance to use different ALD coatings using different chemistries and refer to the importance of chemical precursors and impurities arising from such chemicals. All this can be true, but how does this relate to the present manuscript and its goals?

The introduction is written for readers with expertise either in ALD or shape memory alloys. This is why the introduction is more general because e.g. readers who work in the field of shape memory alloys may be unfamiliar with ALD. Some parts may seem to be without a direct relation to the study. The possible presence of impurities was mentioned in the introduction part because some organic impurities were found in Pt and Al₂O₃ ALD coatings in the present study (indicated by XPS).

8. In rows 93-94, the authors write that „The ALD process for Pt on NiTi is not straightforward. The standard precursors are (trimethyl)-methylcyclopentadienyl-platinum(IV) (MeCpPtMe₃) [40-43] or Pt(acac)₂ (acac=acetylacetonate) [44,45]“. Yes, the Pt deposition process is not straightforward on any substrate, and also there are no „standard“ precursors for this process. Precursors chemicals applied in any paper can not yet be called standard precursors. Besides, the authors refer to studies devoted to the platinum growth on TiO₂ and say in the row 99 that, therefore, boosting of growth of Pt on NiTi is needed. Why „therefore“?

The word “standard“ is replaced by “usually used“. The sentence “Therefore, boosting initial ALD growth of Pt on NiTi is needed.“ was omitted in the manuscript.

9. In the Section 2.2, it seems that the reactor type and conditions are not revealed for a reader.

The deposition was performed in home-built ALD reactor assembled (including all accessory parts) in Taiwan Instrument Research Institute (TIRI). The details of Pt deposition are newly revealed in the revised manuscript.

10. In the section 4.2, the authors tell, that the shift of the Al 2s peaks in XPS spectra is likely due to the changing Al/O ratio with the changing number of the ALD cycles. How can that be possible, if the number of Al₂O₃ growth cycles was fixed at 10?

This part of text was removed as recommended by the second and third referee.

11. It is not exactly understood, why the authors have organised TEM on Pt100 sample (Fig. 3). There is nothing in this Figure, which could be distinguished and recognized as traces of platinum (dots). Also the 1 nm thick Al₂O₃ layer can not be visualized. Instead, there are EDS profile from supporting materials (Ni, Ti, Cu, and W) and diffraction pattern from the substrate, which can both be considered as natural parts of the sample, even trivial data. Besides, where did the TiO₂ layer visible in panel c) come out? The TiO₂ was not included in the description of sample Pt100 in Table 1. In fact the whole Figure 3 looks somewhat unnecessary.

Explanation of where did the TiO₂ layer visible in panel c) come out: NiTi layer can oxidize at its surface even at room temperature. Usually, Ti oxidizes to form TiO₂ whereas Ni remains in NiTi matrix or can be partly present in TiO₂.

The TEM figure can be useful in respect to the structure of the NiTi layer. It is why the authors prefer to keep this figure in the manuscript.

12. In the end, it became obvious, that after applying the revealed low amount of Pt growth cycles, the authors have still achieved a distribution of the Pt nanodots. Why did the authors not attempt the growth of continuous Pt films just by increasing the amount of deposition cycles? What was expected - how could a distribution of the discontinuous Pt dots possibly affect the mechanical behavior of thick NiTi layer?

Increasing the number of ALD cycles will likely result in a higher level of unwanted oxidation or precipitation (Ni₄Ti₃) in the NiTi films and hence deterioration of thermomechanical properties of NiTi layer may take place. The deposited Pt NPs themselves most likely do not have any effect on the mechanical behavior of ~1 micron thick NiTi layer; however, the Pt ALD process consists of holding the samples at 300 deg. C for a time proportional to the number of applied ALD cycles. This kind of “annealing” can change the mechanical behavior of the NiTi layer.