EVALUATION OF Master's THESIS
Student: Lukes Vojtech, Czech Technical University in Prague

This thesis investigates the possibility of using Mg alloy for biomedical application in a way to take benefit from its closer stiffness to that of the natural bone while managing the issue associated with its intrinsic high corrosion rate leading to premature failure.
The thesis proposes a hybrid coating process including cold spraying a dense layer of pure Ti acting as a shielding layer followed by a bioactive hydroxyapatite layer deposited by plasma spray. The samples have been extensively characterized after the application of these coatings, mostly regarding chemical, microstructural and physical properties.
The thesis is well-structured and written in a very clear way. The requirements of biomaterials for successful implementation, as well as the state of the art on cold spray and plasma spray are reviewed.
The experimental part including powder characteristics, selection of the process parameters and sample preparation is well described, and the obtained results are discussed in depth to draw sensible and realistic conclusions.

Here are some questions and suggestions for future developments:

- What could be considered in future developments is to perform additional tests to characterize the samples in terms of mechanical performance, for instance adhesion or scratch tests.
- It would be also interesting to quantify the evolution of surface roughness that will surely affect the performance of the samples in biological environment.

- Is it possible that the heat input from plasma spray can enhance the bonding between the Ti particles that were originally barely deformed during cold spray deposition?
- Do you expect the surface roughness of the cold sprayed layer to affect the adhesion and growth of the second plasma sprayed layer?
- How do you think you can control the HAP layer's porosity? As the range of porosity that promotes osteointegration is higher, it would be nice to further increase porosity of the top layer. Of course, that will be desired if structural integrity is not compromised. Can you suggest a practical way of finding a compromise? Which one would be more effective: tuning the spray parameters or changing particle's size and morphology?

Overall, I rate the thesis with grade A and recommend it to be accepted for oral defense.

Sara Bagherifard
Associate Professor
Department of Mechanical Engineering
Politecnico di Milano
Italy

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