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The thesis investigates the possibility of using tungsten coatings deposited by RF-ICP for nuclear fusion reactor applications. The thesis aims to develop deposition process parameters, conduct coating analysis, and compare the parameter-coating property influences of four identified parameters.

The first part of the thesis has good flow and clarity. It includes a comprehensive introduction to the intended end-use, current solutions and problem statements. The explanation of the choice of using RF-ICP over other thermal spray processes like DC plasma is also clearly described, in addition to potential shortcomings such as coating porosity.

The second part of the thesis provides clear reporting of the materials, equipment, parameters, and process. Good flow of explanation of process and parameters iterative changes on observed coating microstructures from RF1 to RF12.

In general, good investigative research was conducted and presented in the thesis.

Some minor comments, suggestions and questions are included below:

Page 30, Section 3.2.3, it might be good to reference the standard metallographic preparation procedure used, such as ASTM E1920.

Page 31, Section 4, it might be necessary to explain the choice of the 4 selected deposition parameters based on the expected influence on the process or coating properties. And it might be helpful to list the other process parameters of the RF-ICP processes which these 4 parameters are derived from.

Page 31, Section 4.1, it will be helpful to include images and arrows to highlight the unmelt particles and zoomed-in images to show the dendritic microstructures. It might also be helpful to include images which outline the suggested regular, well-flattened splats.

Page 32, Figure 19, it will be helpful to include arrows to point to the areas of delamination.

Page 33, suggestion to use a consistent technical reporting style of language, especially in the results and discussion chapters.

Page 33, Figure 21, it will be helpful to highlight the areas of coating-substrate diffusion as this was not observed in earlier samples.

Page 38, Figure 29, it will be helpful to clearly highlight the areas of observed locally melted substrate and condensates of powder particles, as these were not observed in previous sample images.

Page 34, suggestion to break the results discussion for powders P1 and P2 into separate sub-sections for clarity of discussion.

Page 35, it might be worthwhile to further explain the possible reasons for the observation of flattening of splats near the substrate-coating interface. Would it be possible for peening / hammering effects to be present in RF-ICP too?

Page 41, Section 4.2.2, typically powder feed rate can be considered as a process parameter, so it might be worth explaining why feed rate was discussed separately from Section 4.2.1. Just a minor comment.

Overall, I rate the thesis with grade B.

In Singapore, on June 23, 2023
Dr. Kelvin Loke