PhD notebook

Hugo REYMOND

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1 Administration

≻ Create tax card, need contract information as salary

⇒ link is here and go to Forskudsopgørelse

≻ Webinar "moving to Denmark and PhD at DTU

⇒ take the session 2026/02/20 from 1pm to 2 pm

≻ Mandaroty introduction culture day

⇒ Chose the option 10 March from 10:45 am to 2 pm

≻ Introduction to responsible conduct of research and research data management for new employees

⇒ chose 6 April from 9am to 1 pm

2 Teaching

2.1 Course preparation

3 Bibliography

3.1 Powder production processes

3.1.1 Gas atomization

3.1.2 Water atomization

3.1.3 Centrifugal atomization

3.1.4 Plasma atomization

3.1.5 Mechanical attrition and alloying

3.1.6 Melt spinning

3.1.7 Rotating electrode process (REP)

3.1.8 Chemical processes

3.2 Factors influencing metallic powder size and quality during gas atomization

3.2.1 Feedstock melting

One of the melting processes is to use a crucible heated by induction. It allows different types of feedstock such as powder, scrap, wire, and can accept pure metal elements or pre-alloyed elements. All these parameters will impact the powder quality. For instance, the melted scraps can be heterogeneous and may contain oxides and impurities. In these cases, it is recommended to take a sample of the homogeneous melted material in order to analyze the chemistry [1].

Both open and closed melting systems are used in gas atomization. When the metal is molten in open air, the risk of oxidation and contamination is increased, even if the slag provides a natural protection that is very commonly used in pyro-metallurgical processes [2].

In a context of process optimization, caracterizing different feedstocks with the on site facilities would be a nice sanity check to align with the literature results. Eventually, after that first step is controlled, it would be nice to continue the parameters optimization with vacuum heating

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TO-DO LIST

References

[1] Kazybek Kassym and Asma Perveen. Atomization processes of metal powders for 3D printing. *Materials Today: Proceedings*, 26:1727–1733, 2020.

[2] Holappa and Kaçar. Slag Formation — Thermodynamic and Kinetic Aspects and Mechanisms. *Advances in Molten Slags, Fluxes, and Salts: Proceedings of the 10th International Conference on Molten Slags, Fluxes and Salts 2016*, 2016.