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| Book Name: | **Proceedings of the 8th International Conference on Solidification and Gravity** |
| Manuscript Number: | **Ms\_BPR\_ 3590.7** |
| Title of the Manuscript: | **Solidification Kinetics of Zr-Cu-based Alloys: Experiments on the Ground and in Microgravity** |
| Type of the Article | **BOOK CHAPTER** |

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| **PART 1: Review Comments** | | |
| **Compulsory** REVISION comments | **Reviewer’s comment** | **Author’s Feedback** *(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)* |
| **Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimum of 3-4 sentences may be required for this part.** | This manuscript is important for the scientific community as it provides valuable insights into the solidification kinetics of Zr50Cu35Ni15 alloys, an area critical for understanding material behavior under extreme conditions. By comparing solidification under both terrestrial and microgravity environments, the study addresses fundamental questions about the influence of gravity on dendritic growth and recalescence morphology. I appreciate the manuscript for its rigorous experimental methodology, the novelty of combining ground-based and microgravity data, and its potential applications in developing high-performance alloys for aerospace and advanced manufacturing. The clear documentation of transitions in crystal growth mechanisms  contributes significantly to the theoretical understanding of solidification processes. |  |
| **Is the title of the article suitable?**  **(If not please suggest an alternative title)** | The title **"Solidification Kinetics of Zr-Cu-based Alloys: Experiments on the Ground and in Microgravity"** is suitable as it clearly reflects the core focus of the manuscript, emphasizing the solidification kinetics of Zr-Cu-based alloys and the dual experimental conditions (ground and microgravity). However, for enhanced clarity and precision, the title could be slightly refined:  **Suggested Alternatives:**  **1. "Solidification Kinetics and Morphological Transitions in Zr-Cu-Ni Alloys: Ground and Microgravity Experiments"** |  |

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|  | 1. **"Effects of Gravity on Solidification Kinetics of Zr-Cu-Ni Alloys: Insights from Ground and Microgravity Studies"** 2. **"Dendritic Growth and Solidification Kinetics in Zr50Cu35Ni15 Alloys under Ground and Microgravity Conditions"** |  |
| **Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.** | **My suggestion (**Experimental results on the solidification kinetics of the glass-forming Zr50Cu35Ni15 alloy are presented, with measurements conducted in terrestrial (1g) and reduced gravity environments. Using electromagnetic levitation (EML) facilities, we observed transitions in the recalescence front morphology—from square to hexagonal and finally to rounded shapes—at increasing undercooling levels, reflecting changes in the dendrite growth mode. These transitions are attributed to shifts in crystal growth directions (from 〈100〉 to 〈111〉) and a globular morphological transition at high undercoolings. The microgravity environment enabled reduced convection, allowing clearer insights into solidification kinetics and dendritic behavior. These findings enhance understanding of solidification processes and have implications for designing advanced glass-forming and  intermetallic alloys for critical applications) |  |
| **Are subsections and structure of the manuscript appropriate?** | The subsections and structure of the manuscript are generally appropriate for presenting the experimental study and findings. The Experiment section is thorough, providing clear descriptions of the materials, methods, and equipment used, which is essential for reproducibility. |  |
| **Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimum of 3-4 sentences may be required for this part.** | This manuscript is scientifically robust and technically sound, as it employs well-established experimental techniques, such as electromagnetic levitation (EML), high-speed imaging, and energy-dispersive X-ray (EDX) mapping, to study the solidification kinetics of Zr50Cu35Ni15 alloys. The data presented are comprehensive, with quantitative analysis of dendrite growth velocities, recalescence front morphology, and undercooling levels, all of which are consistent with existing theoretical models and previous experimental findings. The dual focus on ground and microgravity conditions adds a novel dimension, providing deeper insights into the influence of gravity on solidification processes. Furthermore, the manuscript demonstrates clear understanding of thermodynamic and kinetic factors, linking experimental observations to crystal growth directions and morphological transitions, thereby contributing significantly to  materials science and alloy design |  |
| **Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.**  **-** | The manuscript's references are pertinent to the study of solidification kinetics in Zr-Cu-based alloys. |  |

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| Minor REVISION comments  **Is the language/English quality of the article suitable for scholarly communications?** | The language and English quality of the manuscript are generally suitable for scholarly communication, but there are minor issues that could benefit from improvement. The scientific terminology is appropriate, and the ideas are clearly conveyed. However, some sentences are lengthy or overly complex, which can affect readability. Occasional grammatical errors, such as improper article usage or inconsistent verb tense, also detract slightly from the overall polish. An example:  "We have found that the square shape of the recalescence front in samples is changed to the hexagonal shape with the increase of undercooling from its smallest to intermediate values." **Simplification:**  "We observed that the recalescence front changes from a square shape to a hexagonal shape as the undercooling increases from low to intermediate values |  |
| **Optional/General** comments | The manuscript is scientifically robust and provides valuable insights into the solidification kinetics of Zr50Cu35Ni15 alloys under varied gravity conditions. However, minor improvements in language clarity, figure descriptions, and expanded discussion of implications would enhance the overall quality. These adjustments are not substantial and can be addressed with minimal revisions, making the manuscript suitable for publication.  Based on the content reviewed, there do not appear to be any ethical issues in this manuscript. The research follows standard experimental practices, and there is no indication of unethical behavior, such as fabrication of data, lack of proper attribution. |  |

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| **PART 2:** | | |
|  | **Reviewer’s comment** | **Author’s comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)* |
| **Are there ethical issues in this manuscript?** | *(If yes, Kindly please write down the ethical issues here in details)* |  |

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| **Reviewer Details:** | |
| Name: | **Abraham I Ebunu** |
| Department, University & Country | **Alfred University, United States** |