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| Book Name: | **Proceedings of the 8th International Conference on Solidification and Gravity** |
| Manuscript Number: | **Ms\_BPR\_** **3590.5** |
| Title of the Manuscript: | **Comparison of image analysis techniques for the determination of the influence of melt flow on the solidification microstructure of technical aluminum alloys** |
| 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 provides valuable insights into the automated analysis of microstructural images for technical aluminum alloys using advanced deep learning techniques. The comparison between traditional methods and Mask R-CNN for detecting and quantifying Fe-containing intermetallic phases is scientifically relevant. It addresses a critical need in the field, especially for recycling aluminum alloys with increased iron content, aligning well with current sustainability efforts. Overall, the study makes a robust contribution to materials science by exploring the intersection of artificial intelligence and metallurgical processes. |  |
| **Is the title of the article suitable?**  **(If not please suggest an alternative title)** | The title is appropriate |  |
| 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. | The abstract is comprehensive and outlines the research objectives, methodology, and key findings effectively. Minor suggestions:   1. Clarify the significance of comparing manual and automated methods explicitly in terms of potential impact. 2. Avoid overly technical terms like "Mask R-CNN" without a brief explanat |  |
| **Are subsections and structure of the manuscript appropriate?** | The manuscript structure is logical, with well-organized sections covering introduction, experimental setup, results, and conclusions. Subsections effectively guide the reader through the study. Minor suggestions:   * Consider adding a schematic diagram of the workflow in the methods section for better clarity. * Consolidate the discussion on limitations and future applications in a separate paragraph. |  |
| **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.** | The manuscript is scientifically robust, presenting detailed experimental procedures and advanced analysis. The integration of machine learning for material characterization is a notable strength. However:   * The discussion could benefit from additional comparative metrics between manual and AI-derived analyses, such as computation time or error margins. * Elaborate on the challenges in applying Mask R-CNN to microstructures with overlapping phases. |  |
| **Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.**  **-** | The references are recent and relevant, but a few more citations on the advancements in AI-based image analysis in metallurgical applications could strengthen the literature review. Suggested additions:   * Articles on practical applications of Mask R-CNN in related engineering fields. * Studies on the limitations of AI in analyzing complex microstructu |  |
| Minor REVISION commentsIs the language/English quality of the article suitable for scholarly communications? | - |  |
| Optional/General comments |  Highlight how this study's findings could influence the recycling industry's practices.   Discuss potential industrial collaborations or future experimental setups to test other alloys. |  |

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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: | **Priya Dongare Jadhav** |
| Department, University & Country | **Symbiosis International University, India** |