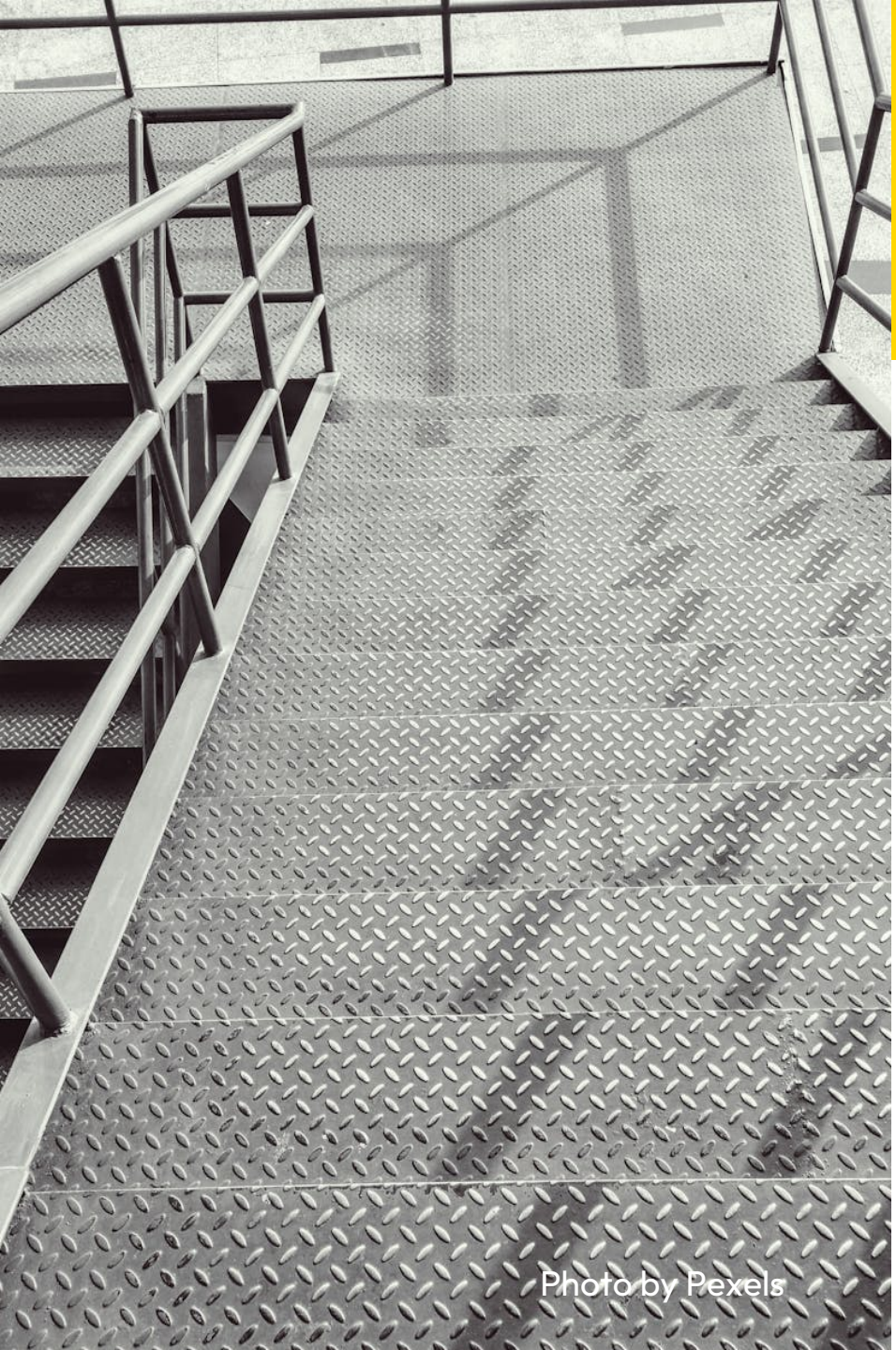

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Shape Characterization in Metallic Powder Particles

Advanced Techniques in Particle Image Analysis

Table of Contents

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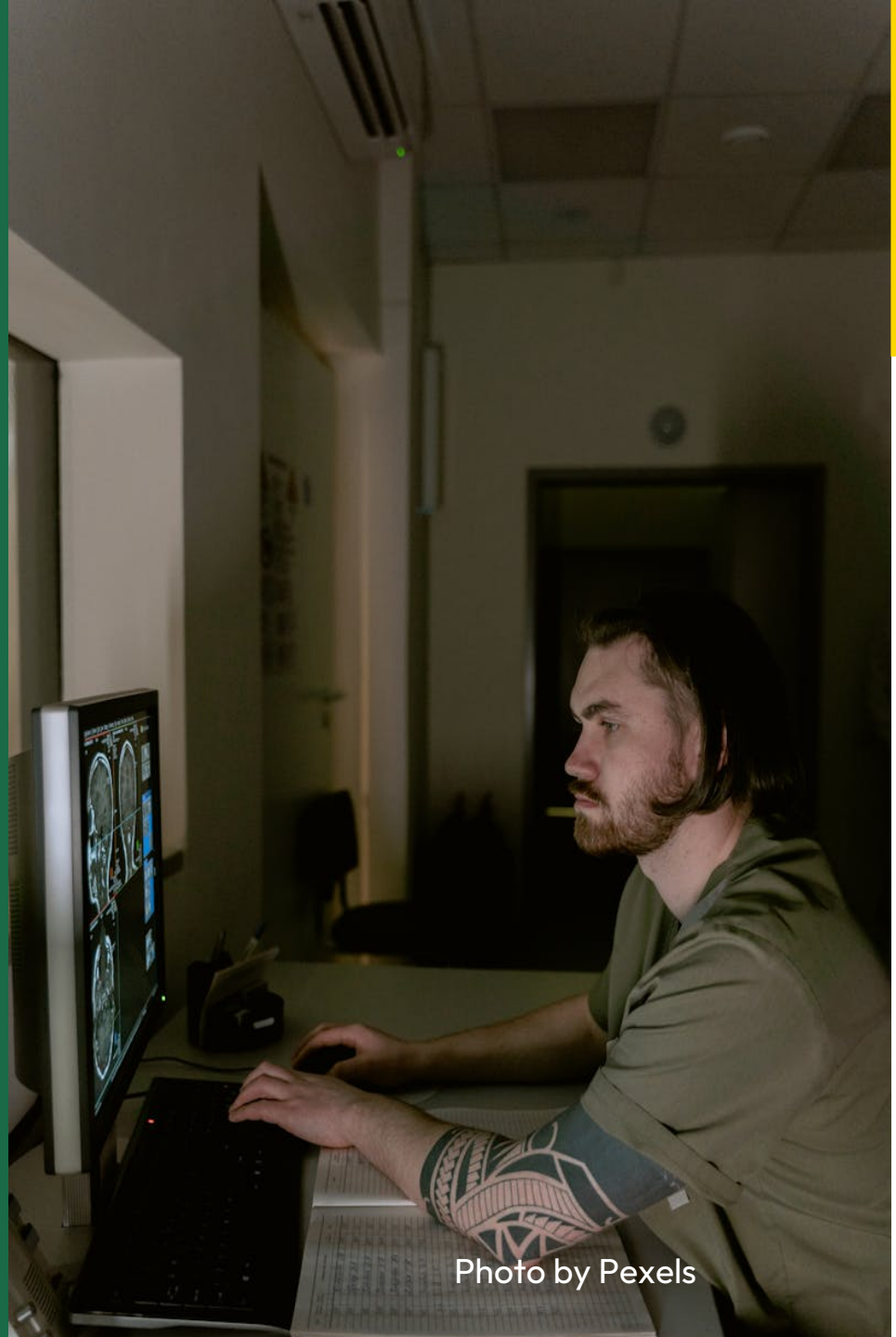
1

Introduction to Shape Characterization

Significance

- Significant progress in Image Analysis & Pattern Recognition with applications in medical imaging, materials science, and biometrics.
- Essential for object recognition, classification, and segmentation, focusing on metallic granules impacting material quality and properties.
- Traditional techniques rely on basic geometric parameters but have limitations in precision due to noise and image settings.
- Advanced techniques offer robustness to transformations yet are underexplored in particle image analysis.



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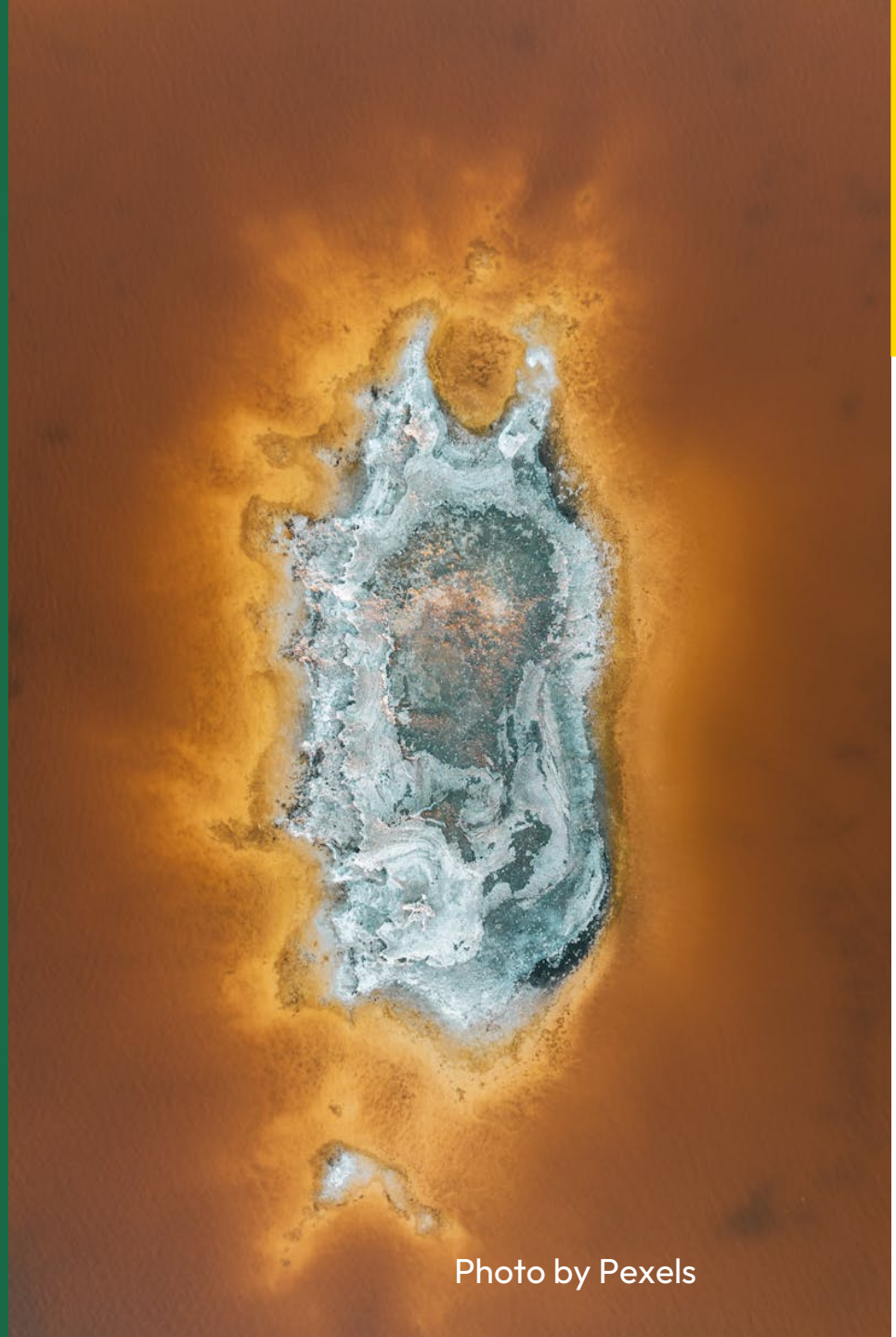
2

Importance of Advanced Techniques

Motivation

- Limitations of traditional techniques include dependency on basic geometric properties and susceptibility to noise and variations in image capture.
- Advanced techniques provide robustness to transformations, enhanced accuracy, and reliability, crucial for high-precision applications.
- The need for advanced techniques is highlighted, especially in the context of particle image analysis where robustness and accuracy are essential.
- Underexplored advanced techniques can significantly enhance particle shape analysis in materials science.



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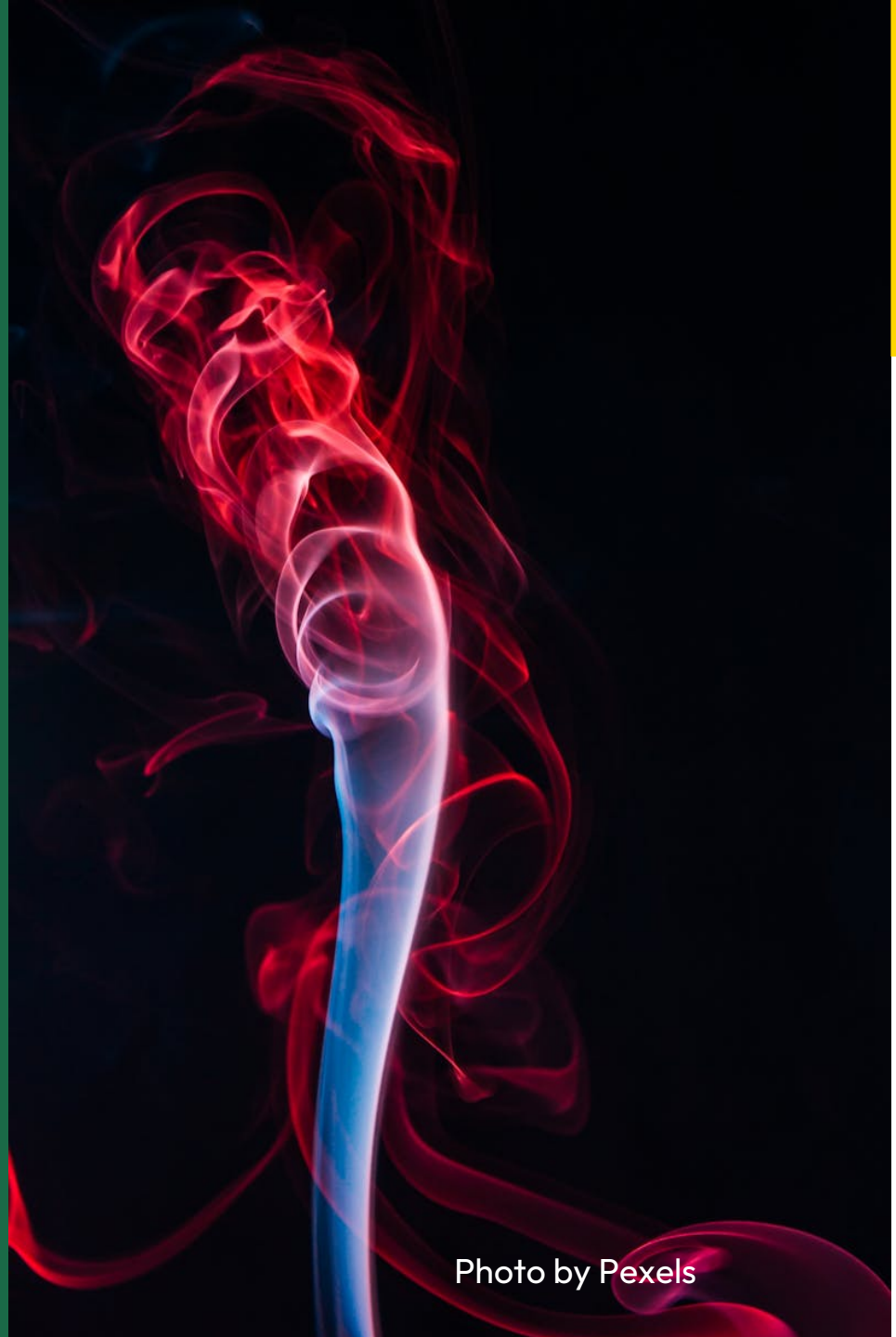
3

Implementation and Evaluation

Objective 1

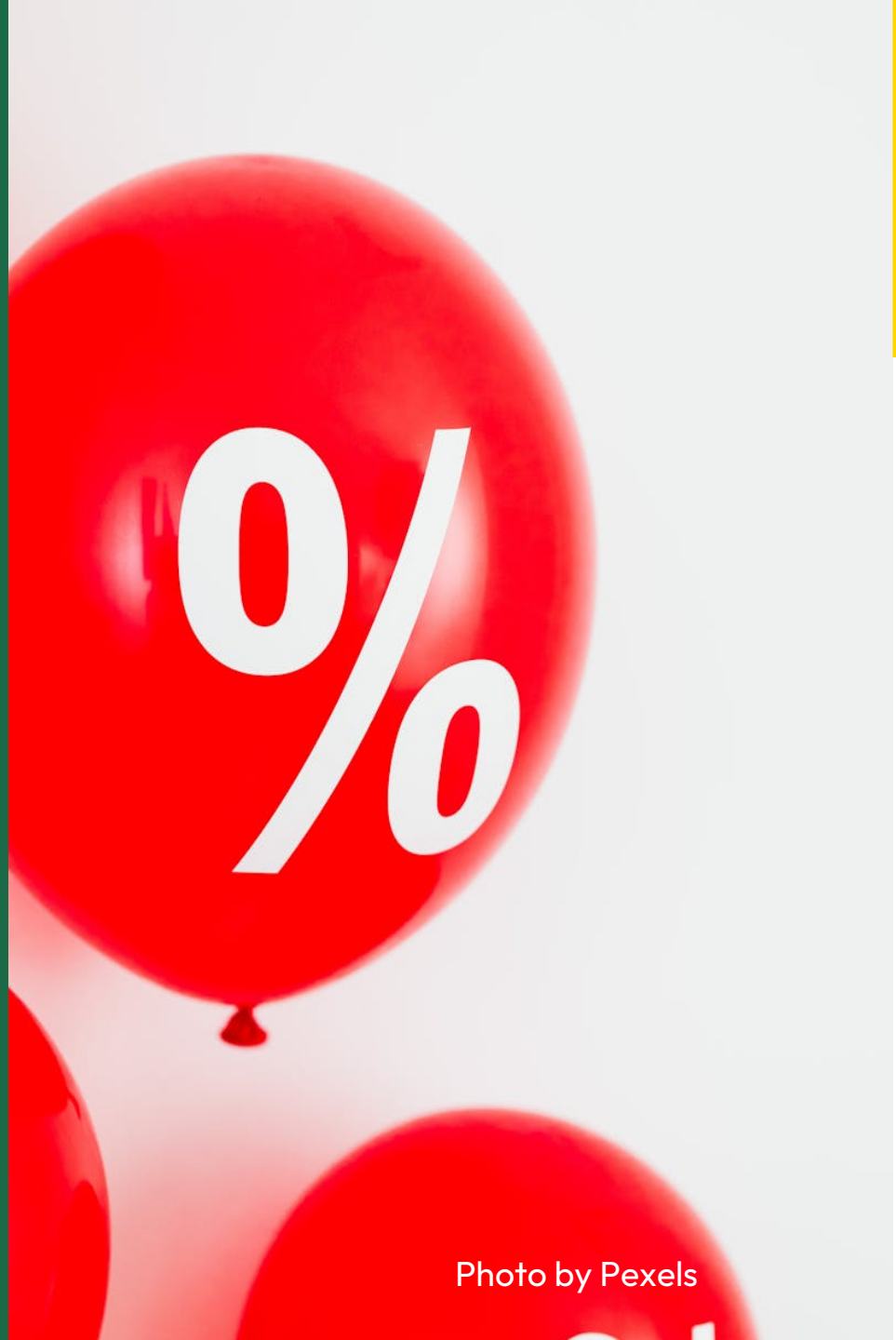
- Implement and evaluate both basic and advanced shape descriptors to improve shape characterization precision.
- Comparing traditional and advanced methods helps identify the most effective techniques for metallic powder particle analysis.
- Ensuring a comprehensive approach in implementing shape descriptors for enhanced material quality and properties assessment.
- Enhanced precision in characterizing metallic granules using advanced shape descriptors for improved material quality evaluation.



Comparison of Effectiveness

Objective 2

- Analyze the effectiveness of fundamental and sophisticated descriptors to understand capabilities and constraints for specific applications.
- Insights gained from the comparison help in selecting suitable descriptors for accurate particle shape analysis in materials science.
- Understanding the effectiveness of advanced descriptors in enhancing accuracy and robustness in particle shape analysis methods.
- Choosing optimal methods for particle shape analysis based on a comparison of traditional and advanced shape descriptors.



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5

Dimensionality Reduction Techniques

Objective 3

- Apply PCA and FPCA techniques to manage large feature sets, improving processing efficiency and data visualization.
- Enhancing data processing efficiency by focusing on crucial traits using dimensionality reduction techniques like PCA and FPCA.
- Enhanced efficiency in subsequent analysis through managing large feature sets with PCA and FPCA techniques for particle shape characterization.
- Improved data visualization and processing efficiency by focusing on key traits using dimensionality reduction techniques in metallic powder particle analysis.