

## Application of LePera Etchant in the Characterization of Multiphase Steels

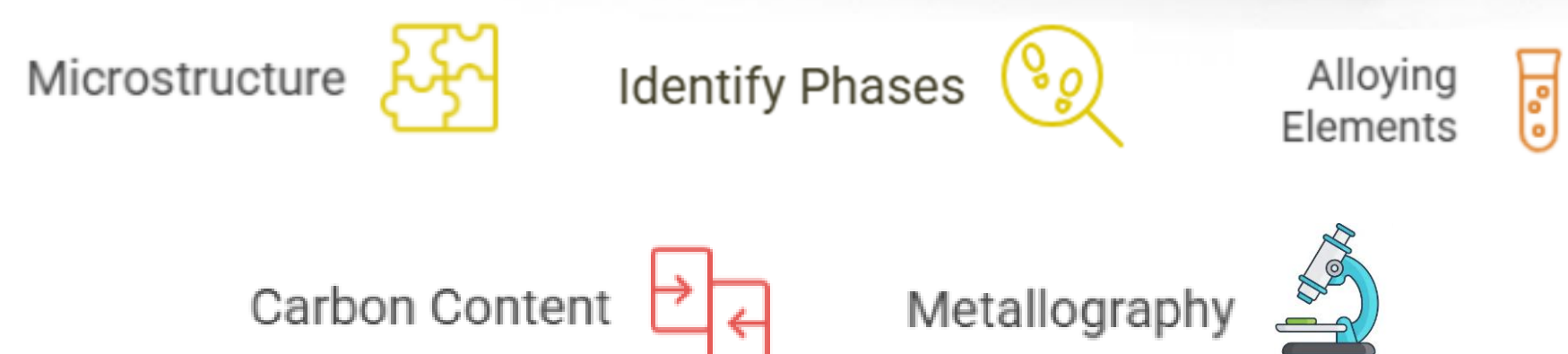
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### INTRODUCTION & AIM

#### TRIP Steel Composition and Characteristics

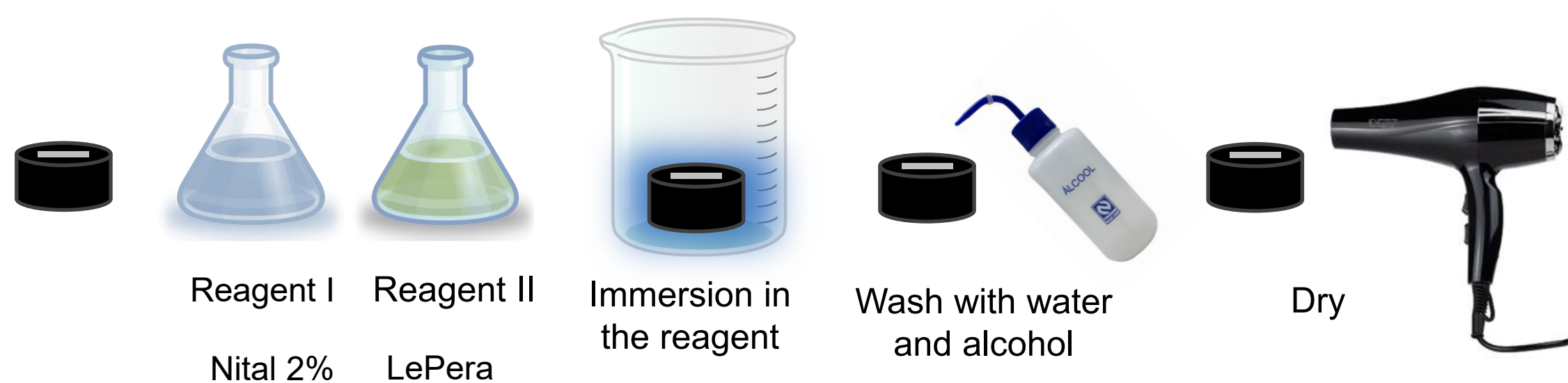
✓ Automotive Industry ✓ Lightweight ✓ High-strength steels



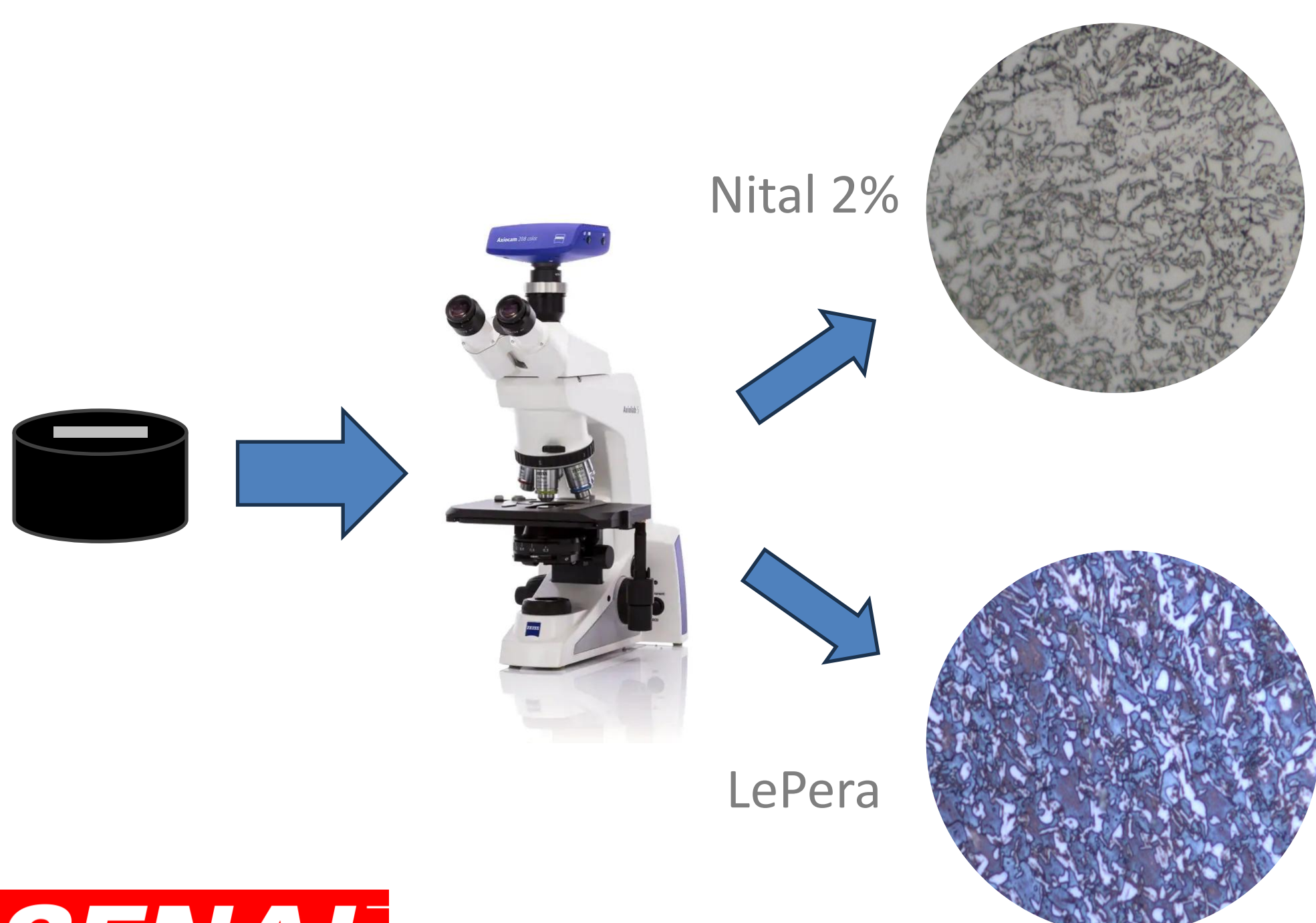
This work reports the application of the LePera reagent to distinguish the multiphase constituents.

### METHOD

The etchant was prepared and applied following standard metallographic procedures to ensure reproducibility and reliability of the microstructural characterization.

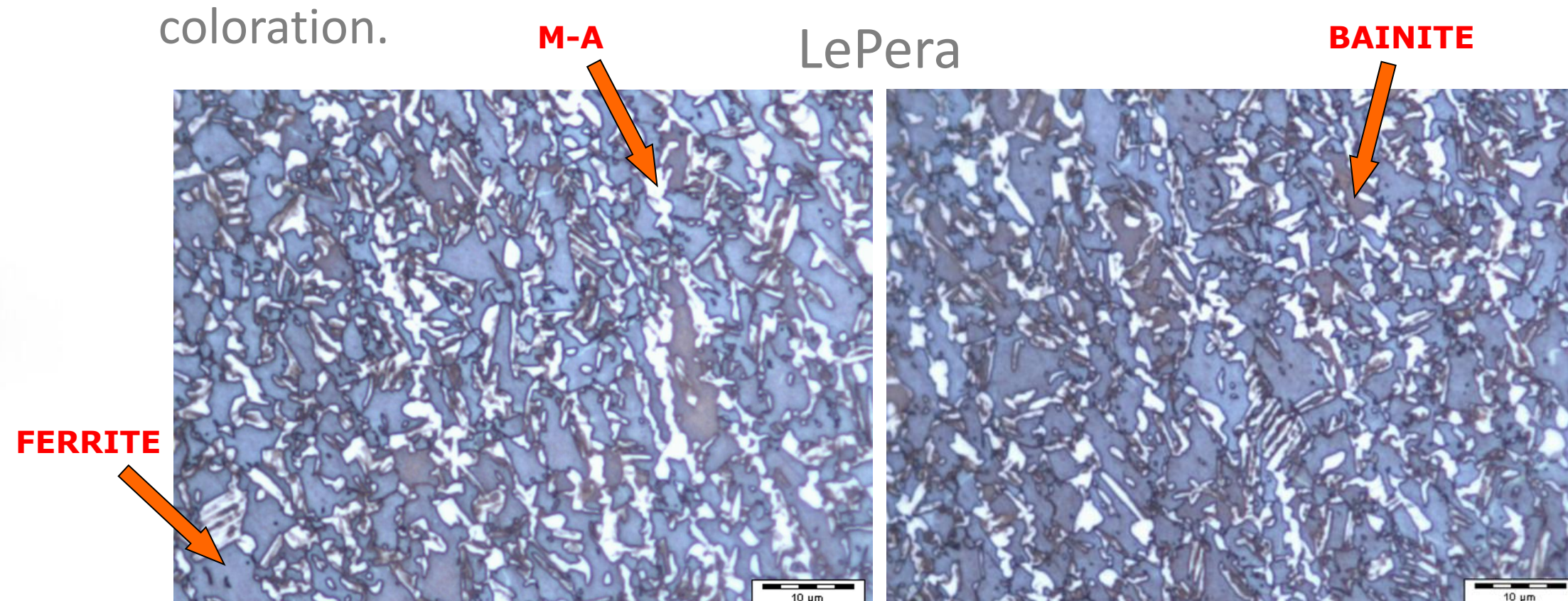


After sample preparation and etching, the specimens were examined using optical microscopy to verify the microstructural phases revealed.

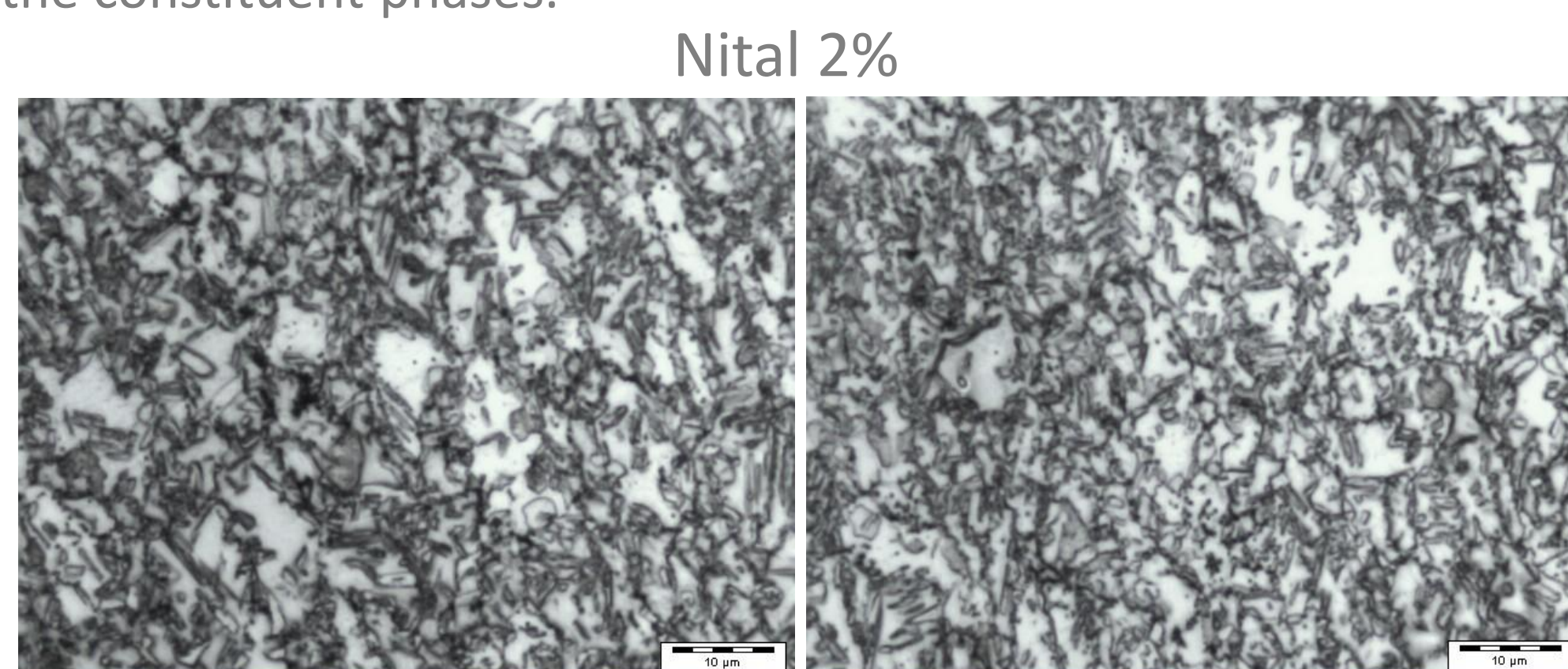


### RESULTS & DISCUSSION

The application of the LePera etchant produced a distinct contrast between the phases present in the TRIP steel microstructure. Ferrite grains were revealed in shades of blue, while bainitic regions appeared in a characteristic brown coloration.



In contrast, the Nital etchant revealed the microstructure only in black and white color, making it difficult to differentiate the constituent phases.



Nital reagent revealed the contours of ferrite grains, but it is not possible to say whether only ferrite microstructure exists in the material.

### CONCLUSION

LePera reagent demonstrated superior performance, enabling visualization and differentiation of the microconstituents present in the material, particularly by highlighting ferrite in blueish tones and bainitic regions in brown.

Despite the improved contrast obtained with LePera, further metallographic refinement is required to resolve the morphology and distribution of the martensite–austenite (M–A) microconstituent. Additional etching procedures, complementary chemical reagents, or advanced characterization techniques (e.g., color etchants, selective etching, SEM or EBSD) are recommended to effectively reveal, quantify, and segregate the M–A islands within the TRIP steel microstructure.

### REFERENCES

- PASHANGHEH, S. et al. Color light metallography versus electron microscopy for detecting and estimating various phases in high-strength multiphase steel. *Metals*, v. 11, n. 6, 1 jun. 2021.
- SALINAS, A. et al. Microstructure-Based Constitutive Modelling of Low-Alloy Multiphase TRIP Steels. *Metals*, v. 9, n. 2, p. 250, 2019.