Séminaire TEAMS - LEM3 Département IMPACT
Le jeudi 24 février à 15h

"Machine learning applied on EBSD data to quantify phase transformation products in Steel "

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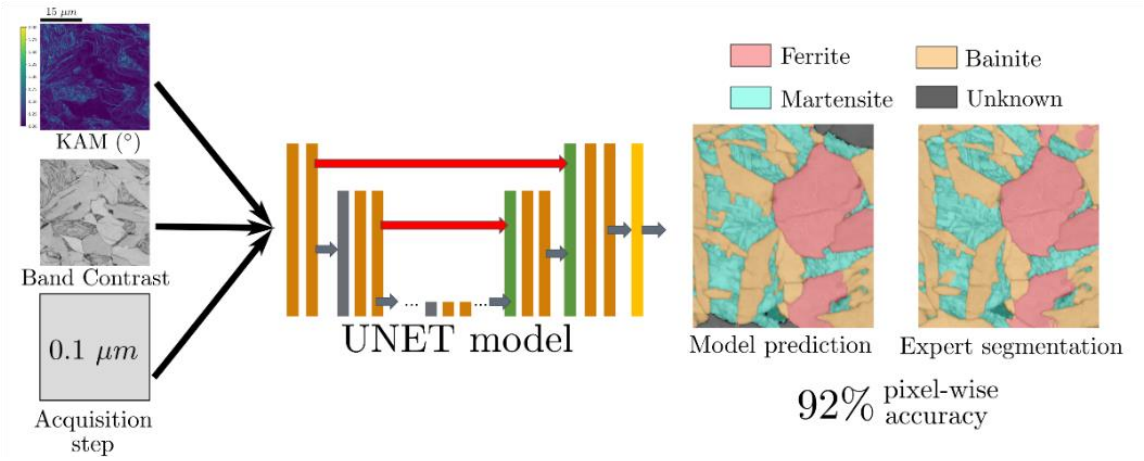
Quantification of the different phases in steels is challenging. It usually relies on micrographs, which features are sensitive to the imaging conditions (etchant, detector used…) and does not always provide enough contrast to differentiate some of the transformation products.
In contrast, EBSD analyses provides a wealth of various features specific to the material's transformation history: Orientation Relationship, low angle misorientation densities, habit planes and diffraction contrast. This work investigates the application of deep learning approaches to quantify different phase transformation products in an industrial steel using EBSD data.

A *U-NET* convolutional neural network was developed for automatic segmentation of bainite, martensite and ferrite in a low carbon steel, using either the orientations, the misorientations and different pattern quality indicators provided by EBSD [1,2]. Alternatively, semi-supervised approaches such as generative adversarial networks were explored to achieve similar results without any manual labelling before training [3].

[1] Martinez Ostormujof T., Purushottam Raj Purohit R., Breumier S., Gey N., Salib M., Germain L. (2021). Deep Learning for automated phase segmentation in EBSD maps. A case study in Dual Phase steel microstructures. Materials Characterization, 184:111638. Réf. HAL: hal-03450484
[2] Breumier S., Martinez Ostormujof T., B. Frincu, Gey N., P.E. Aba-Perea, A. Couturier, N. Loukachenko, Germain L. (2021). Leveraging EBSD data by deep learning for bainite, ferrite and martensite segmentation. Accepted in Materials Characterization
[3] Breumier S., Martinez Ostormujof T., B. Frincu, Gey N., P.E. Aba-Perea, A. Couturier, N. Loukachenko, Germain L. (2022). Unsupervised learning for automatic segmentation of upper and lower bainite on EBSD data, in preparation



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