

For the fast, simultaneous collection of high quality EBSD and EDS maps

Introduction

The Oxford Instruments **AZtecSynergy** system acquires simultaneous EBSD-EDS data from a dual phase material at high speeds and with consistently high hit rates. The EBSD and EDS data is processed as acquired and the maps are viewed in real time.

Experimental

A tungsten heavy alloy (WHA) material containing tungsten particles in a Nickel rich matrix was mounted in bakelite and mechanically polished. The final polishing required the use of hydrogen peroxide.

The specimen was examined in a FEG-SEM operating at an acceleration voltage and probe current of 20kV and 20nA respectively.

An **AZtecSynergy** system with a **HKL NordlysMax** and a **X-Max**® detector were used for the simultaneous data acquisition.

Results and Discussion

A SEM backscattered image from the polished samples is shown in Figure 1, the spherical tungsten particles are distributed homogeneously in the nickel rich matrix. Representative EBSD patterns from the tungsten particles and the nickel matrix are shown in Figure 2.

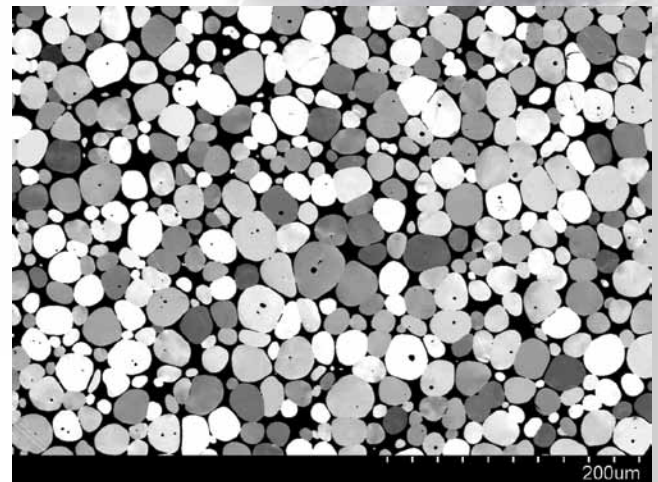


Figure 1 SEM back-scattered image of the polished WHA, examined.

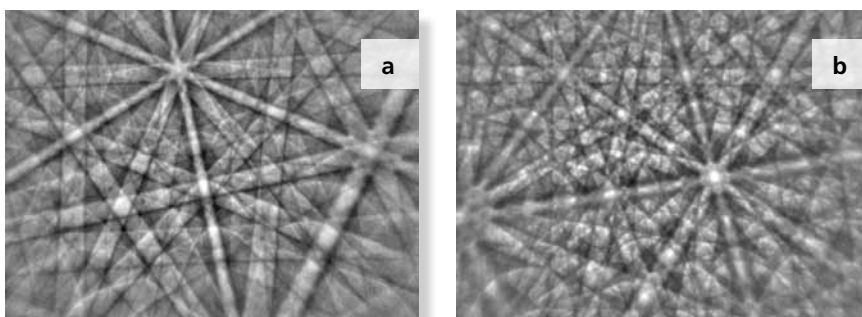


Figure 2 a) & b) Typical EBSD patterns from the matrix and tungsten particles.

Simultaneous data was collected, with the EBSD patterns collected at the different binning settings shown in Table 1. The speeds and hit rates achieved for the selected settings are also given. EBSD maps and the corresponding EDS maps for each acquisition are shown in Figures 3a to 3d. The EBSD patterns were indexed and solved in real time, and the data shown in these maps is unprocessed. Hit rates above 97% were achieved for each indexing speed. Any zero solutions are confined to the particle: matrix interface.

| Pattern Binning | Speed Hz | Hit Rate % |
|-----------------|----------|------------|
| 2x2 | 97.5 | 97.5 |
| 4x4 | 312 | 98.3 |
| 6x6 | 461 | 97.3 |
| 8x8 | 633 | 97.5 |

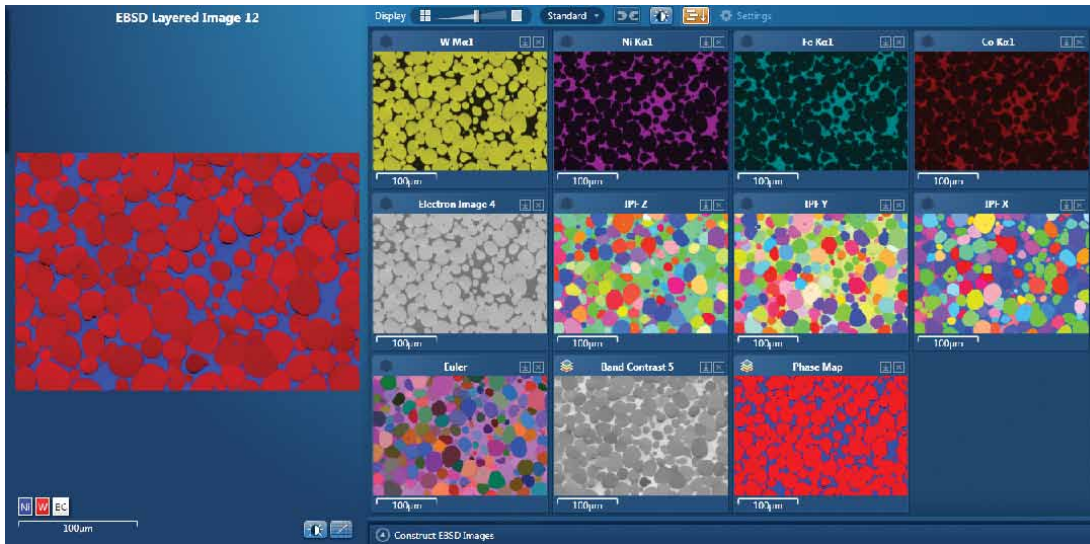


Figure 3a

2 x 2 binning

Acquisition time 2 hours

EDS maps – W, Ni, Fe, Co

EBSD Maps – IPF, Euler and Phase map

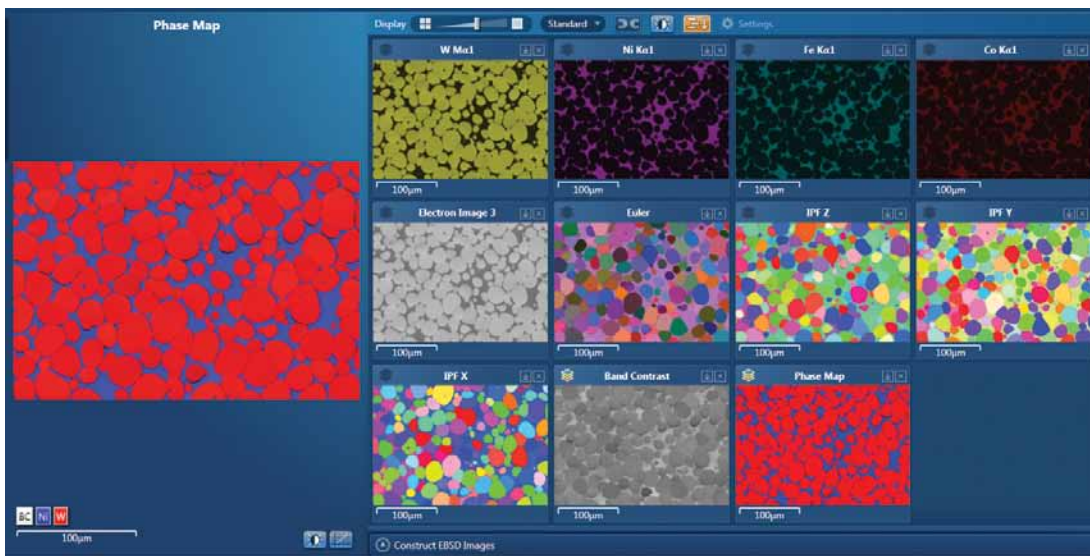


Figure 3b

4x4 binning

Acquisition time 38 minutes

EDS maps – W, Ni, Fe, Co

EBSD Maps – IPF, Euler and Phase map

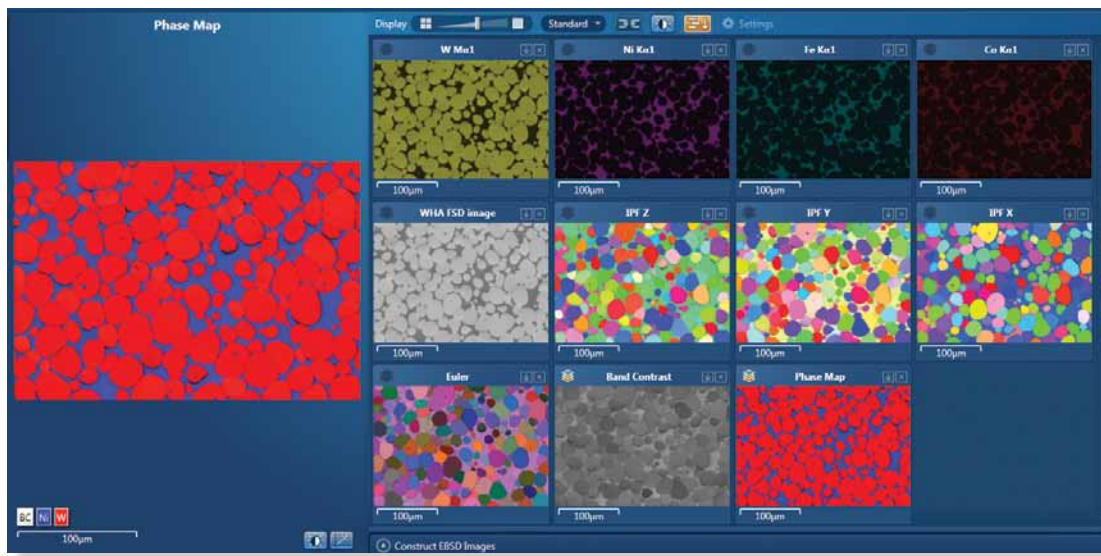


Figure 3c
 6 x 6 binning
 Acquisition time 26 minutes
 EDS maps – W, Ni, Fe, Co
 EBSD Maps – IPF, Euler and Phase map

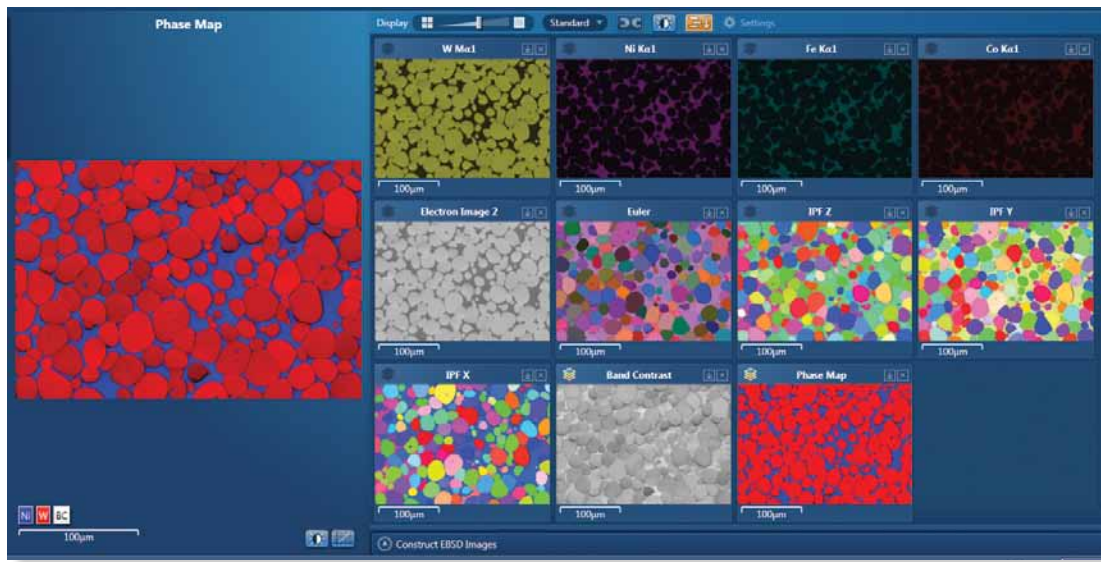


Figure 3d
 8x8 binning
 Acquisition time 18 minutes
 EDS maps – W, Ni, Fe, Co
 EBSD Maps – IPF, Euler and Phase map

Conclusion

This study illustrates the capability of **AZtec**Synergy to acquire and solve high quality, fast simultaneous EBSD -EDS data. The combination of the Tru-I solver combined with the integration in **AZtec** is a powerful solution to fast mapping. Using **AZtec** the EDS and EBSD data can be viewed together in the user interface, giving a true characterisation of the sample in real time.

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