



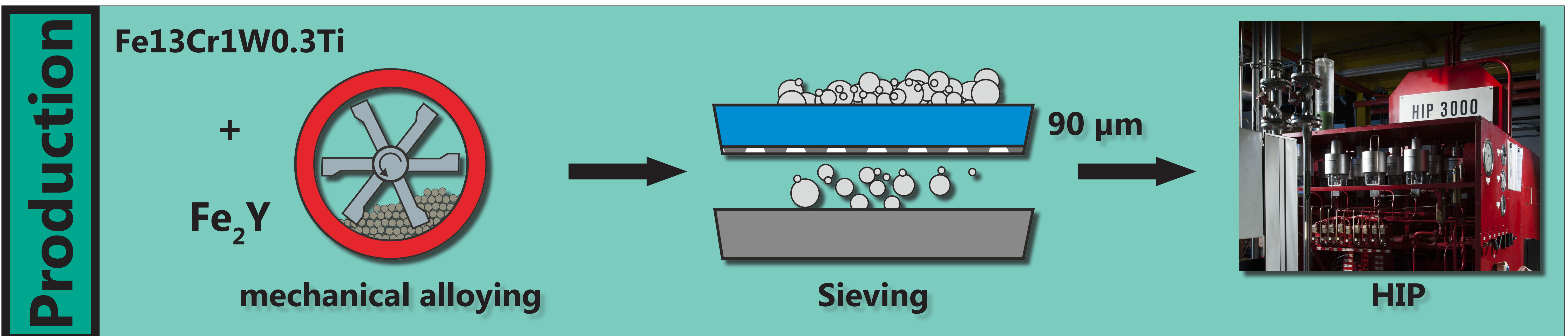
Basic studies on processing of a large scale ODS batch

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In this present study, a batch of 10 kg ferritic steel powder (Fe-13Cr-1W-0.3Ti) was mechanically alloyed in an attritor ball mill with Fe₂Y intermetallic powder. Batches of 3-4 kg with different powder particle distribution were canned in mild steel containers and compacted by hot-isostatic-pressing (HIP).

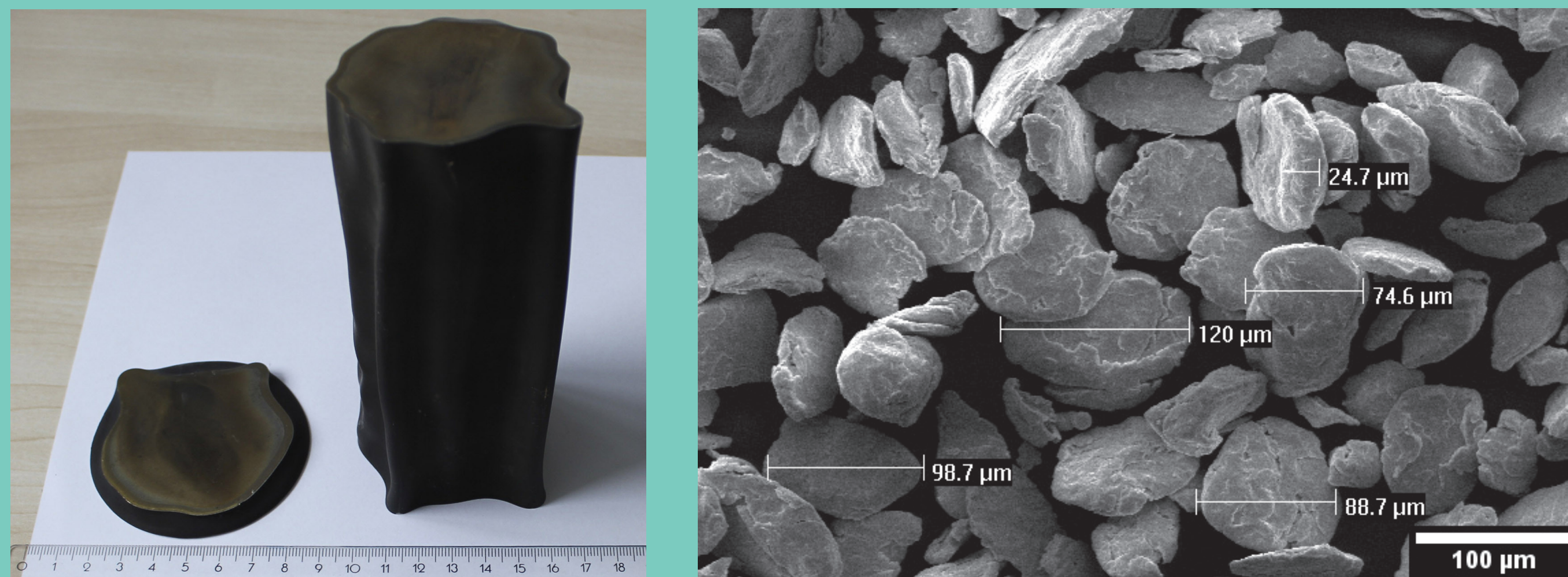


small particle size

The separation of the 10 kg batch with a 90 µm sieve lead to a fraction of:

3.9 kg < 90 µm and 5.4 kg > 90µm

The morphology and general appearance of the powder particles of each batch was similar.



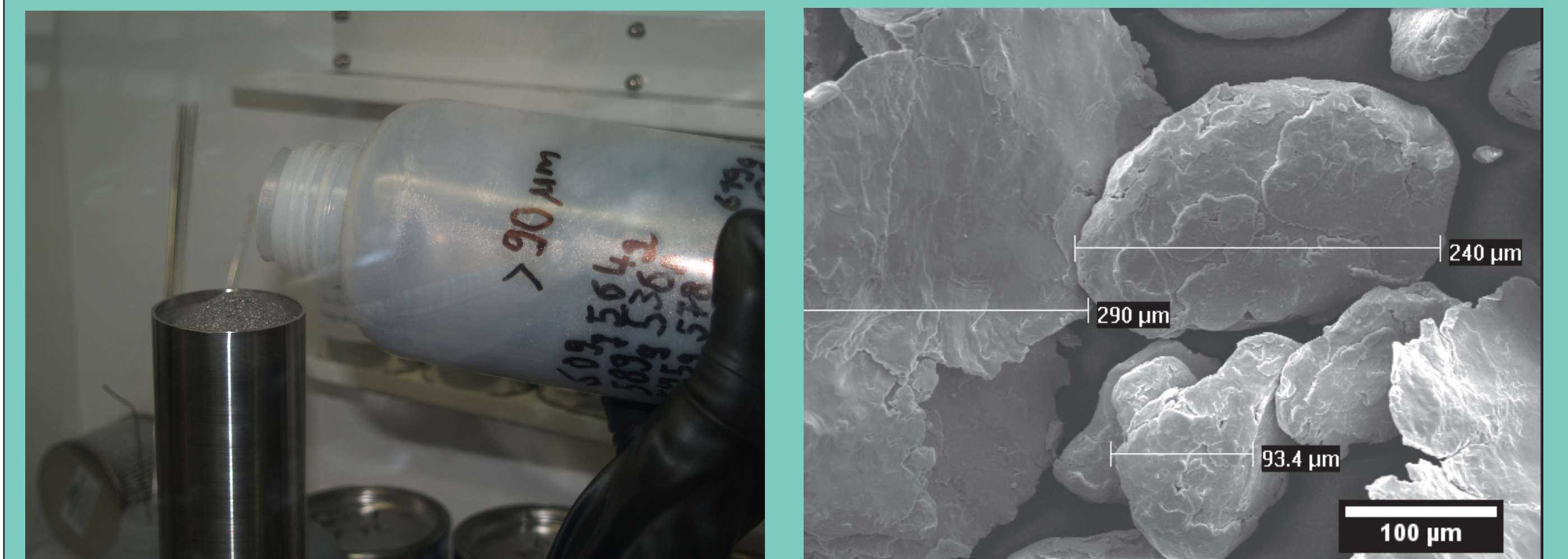
large particle size

The **oxygen content** was measured separately for both fractions:

	O-content	SD	C-content	SD
< 90 µm	0.087 wt.%	0,001	0.0214 wt.%	0,0001

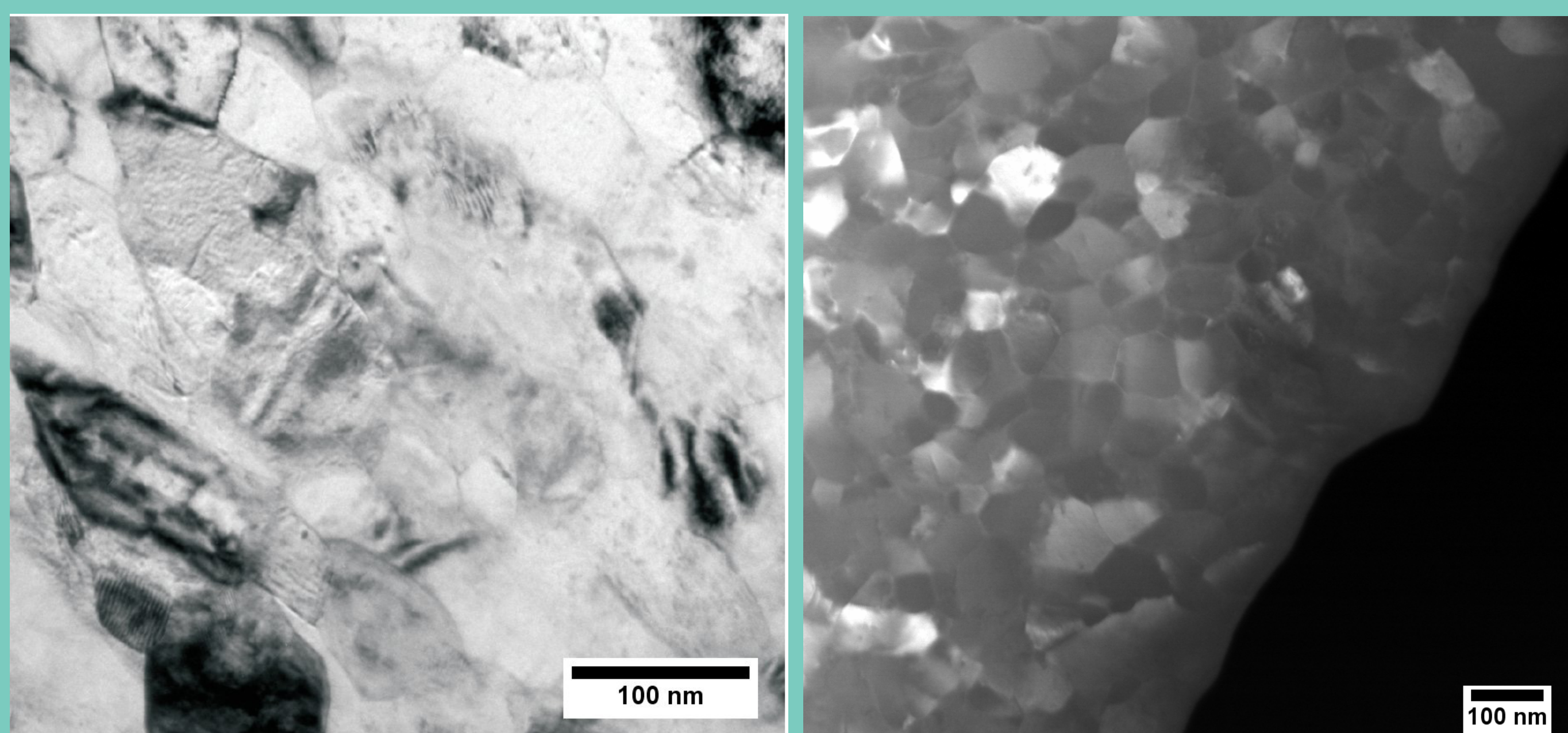
> 90 µm	0.081 wt.%	0,002	0.0216 wt.%	0,0004
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Besides very minor variation in the O-levels, no other differences in the chemical composition and the contamination levels were observed.



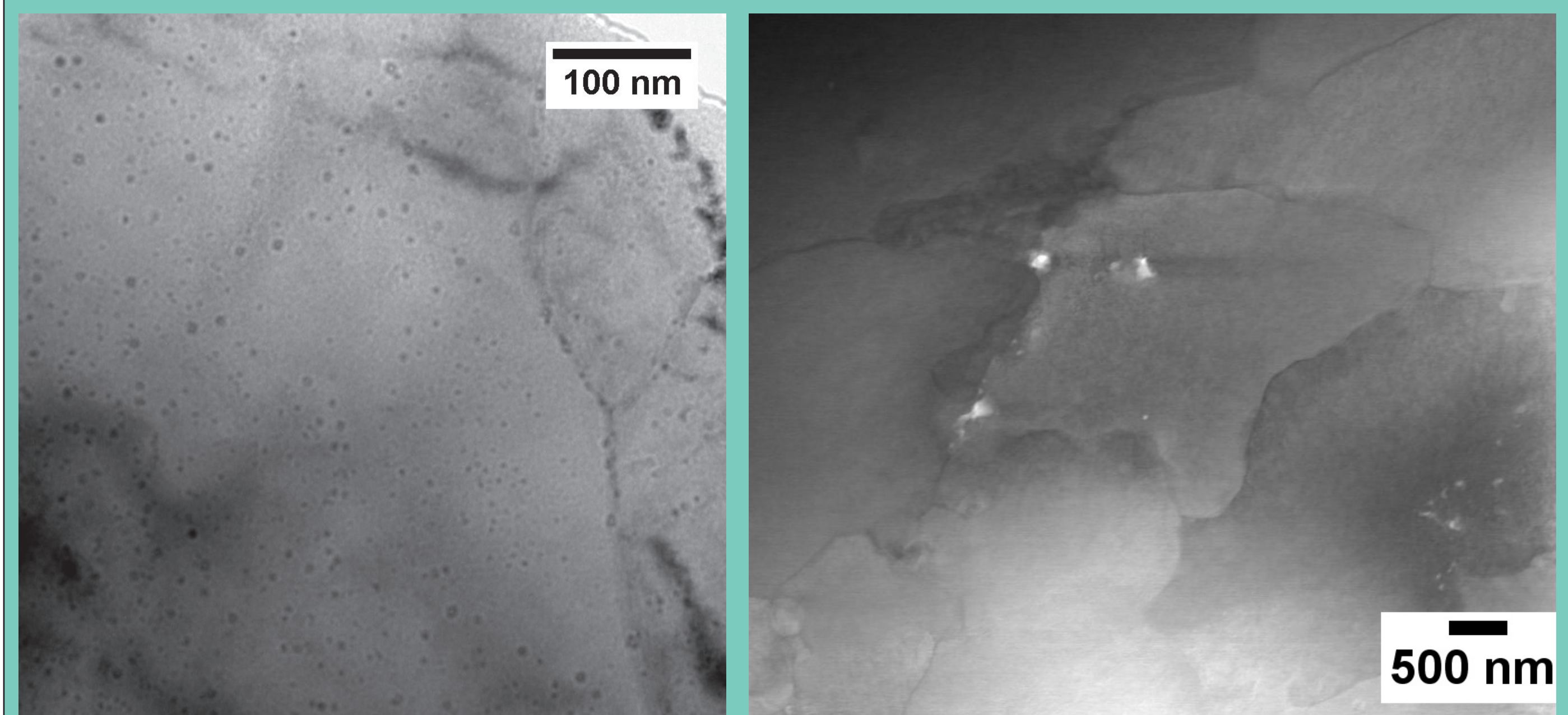
Electron-Microscopy

Particle distribution



Small nanometer oxide clusters in the range between 10-15 nm could be observed in TEM images.

Small particle size lead to a very fine and homogeneous microstructures with grain sizes in the nanometer regime (100 - 400 nm).



A coarser microstructure can be observed in this alloy. Nanoclusters formed during hot-isostatic-pressing inside the grains and on the grain boundaries.

Coarser particles lead to a coarse microstructure. Grains in the small micrometer regime (2-5 µm).

Size of the crystallites can be correlated with the powder particle sizes, but is an order of magnitude smaller in size.