

# Nanostructured NiFeCrWMo high-entropy alloy – alternative binder phase to Co in cemented carbides

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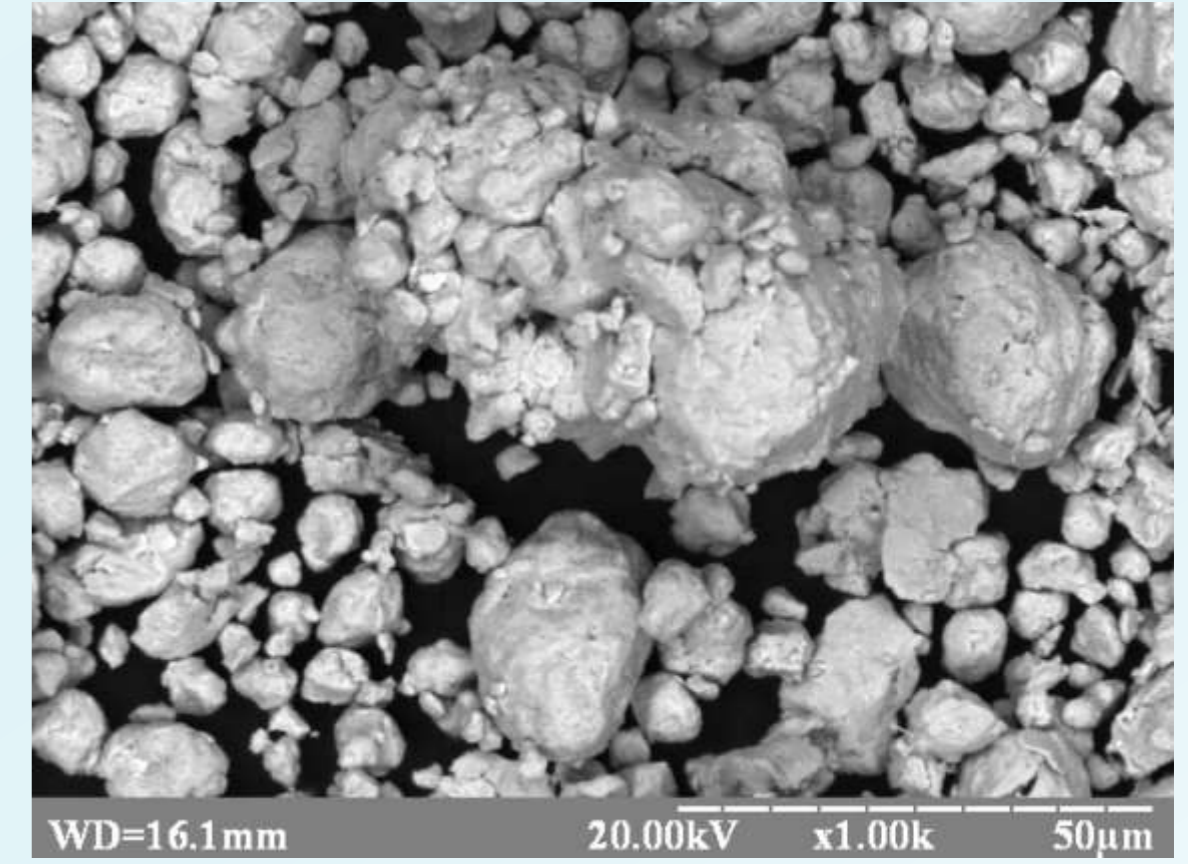
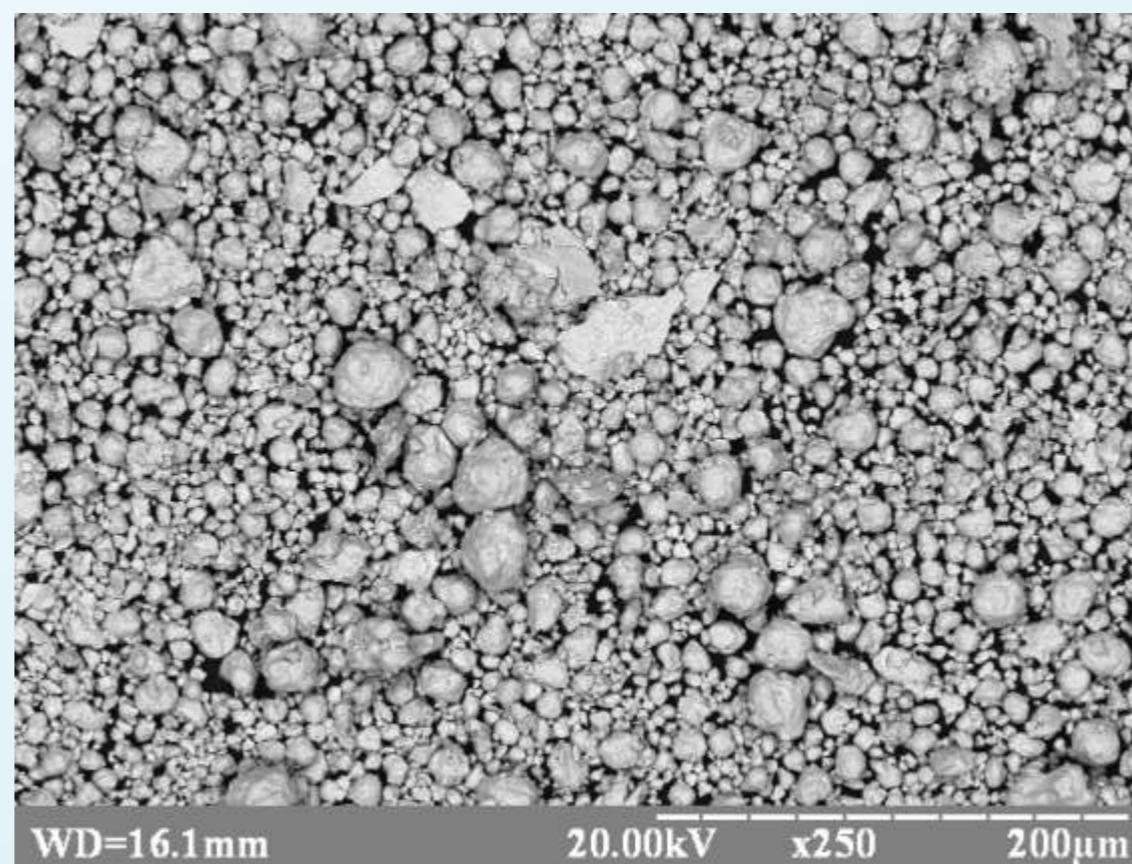
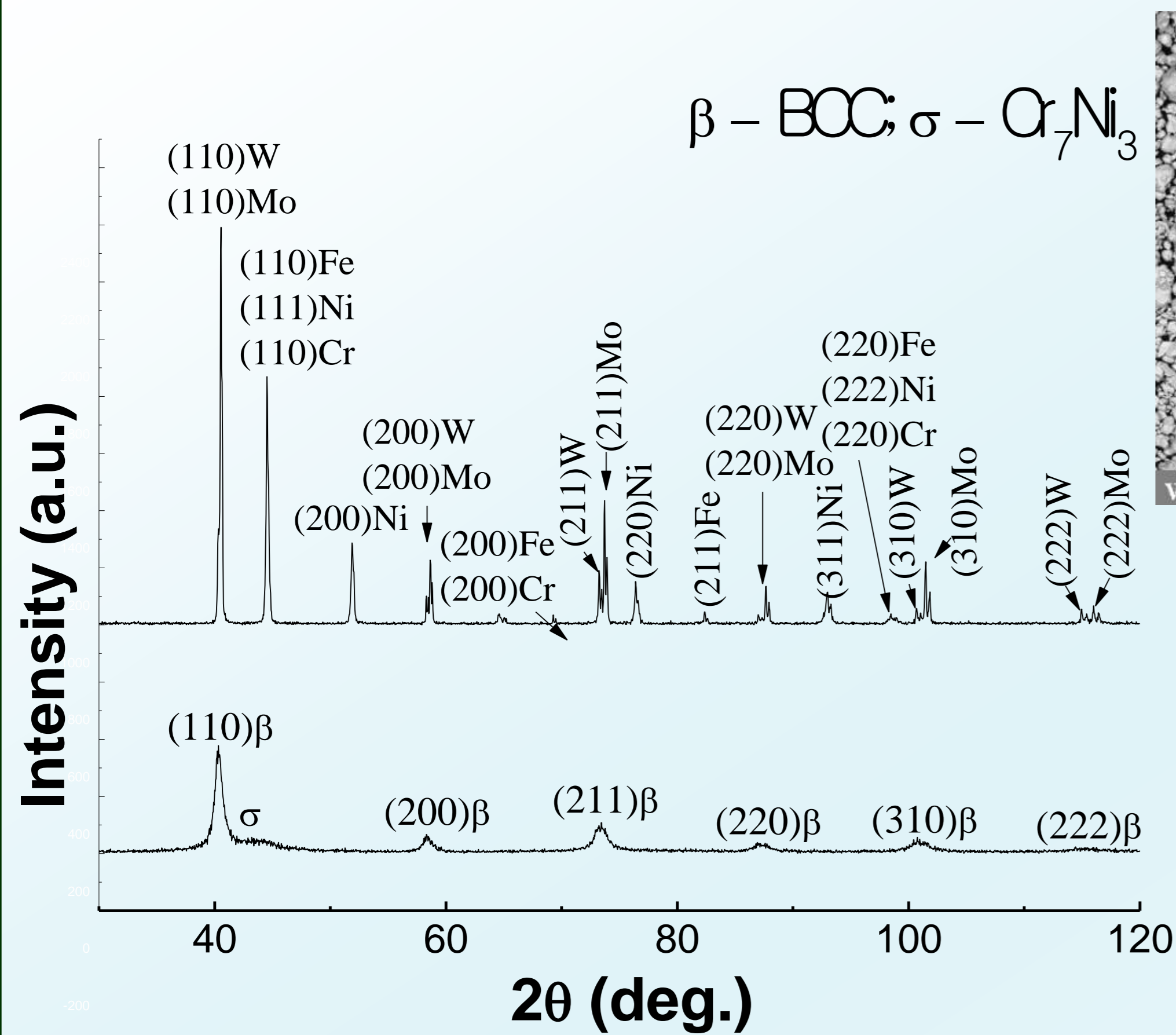
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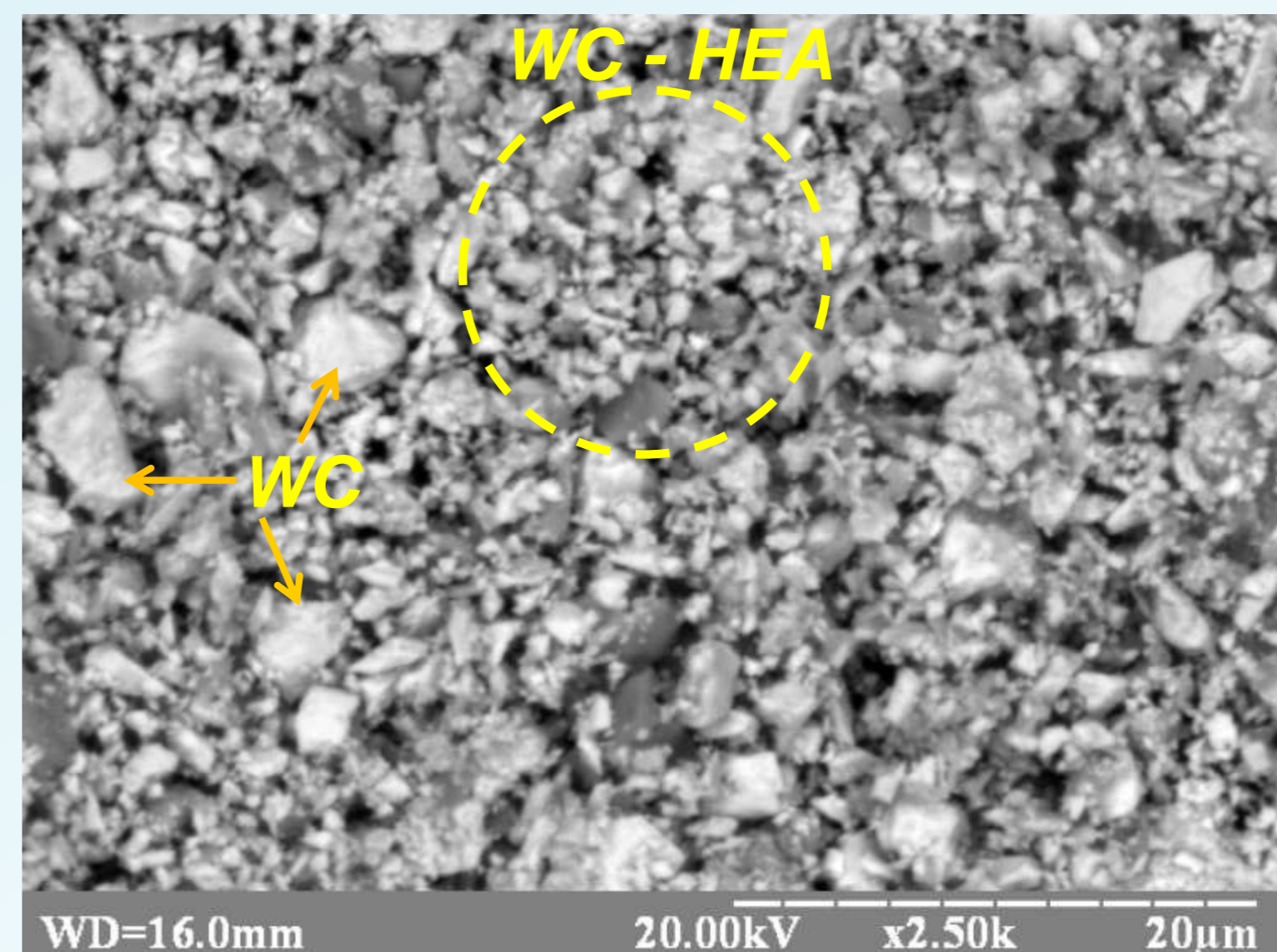


**PURPOSES:** In this work, a nanocrystalline NiFeCrWMo HEA, synthesized by mechanical alloying, was used as the binder phase for substituting Co to fabricate WC–HEA composites by sintering .

## Synthesis of NiFeCrWMo HEA by mechanical alloying (MA) and preparation of the composite WC – HEA powder by ball milling before sintering



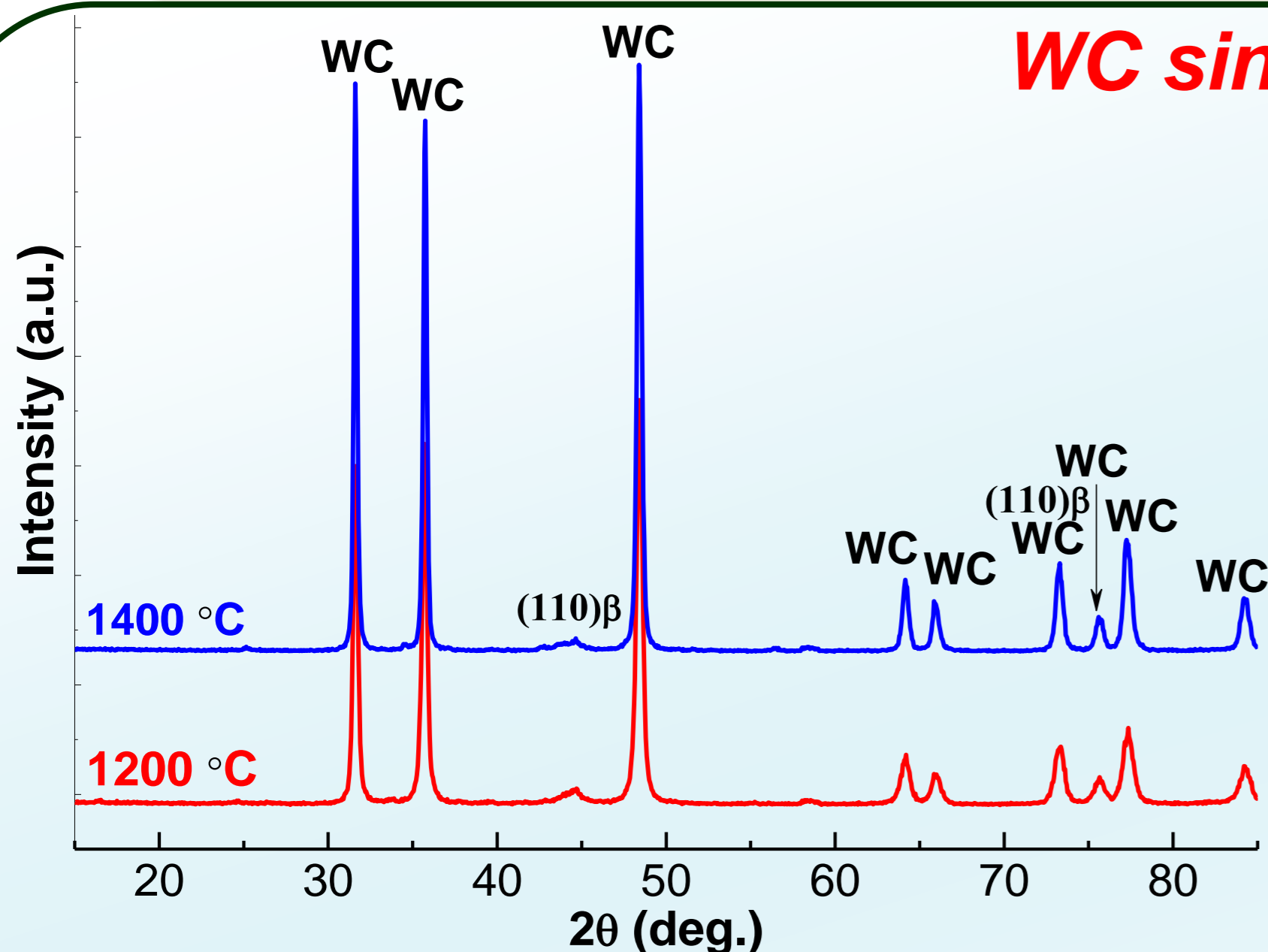
SEM images of NiFeCrWMo HEA powder after 10 h MA



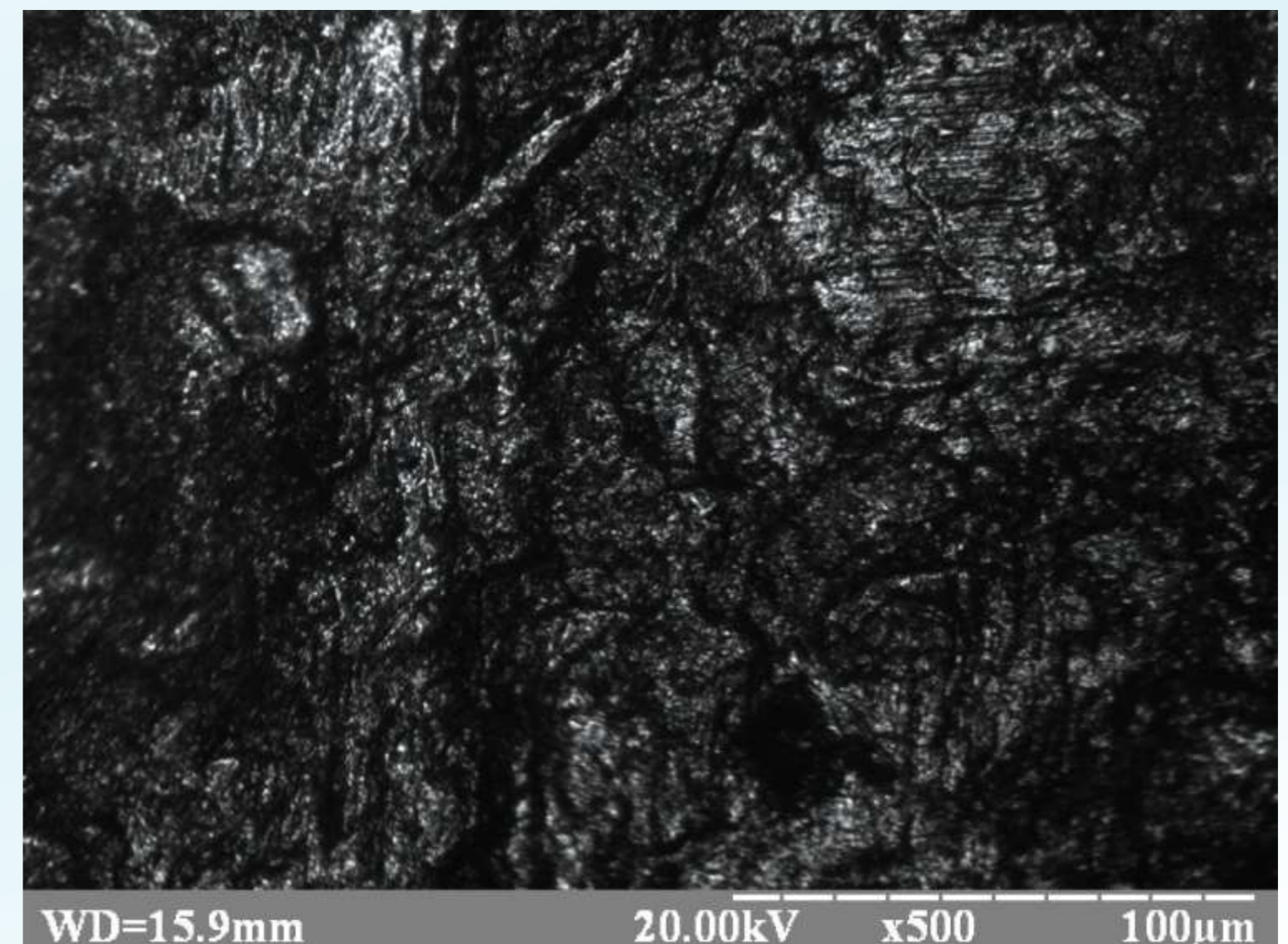
SEM image of WC – 10 wt % NiFeCrWMo HEA powder mixture

XRD patterns of NiFeCrWMo powders as function of ball mill time

## WC sintered with 10 wt.% HEA



XRD patterns of sintered WC–HEA samples



Microstructure of sintered WC–HEA samples

**Conclusion** Compared with cobalt binder, the nanocrystalline NiFeCrWMo HEA binder has an advantage on the inhibition of WC grain growth due to the sluggish diffusion effect, and the average WC grain size decreases. It has been shown that nanocrystalline NiFeCrWMo HEA can be used as a binder for the ultrafine-grained WC-based cemented carbide with high mechanical characteristics.