

Study of TiC influence in particle growth of NbC-Ni cemented carbide using DICTRA[®] simulations.

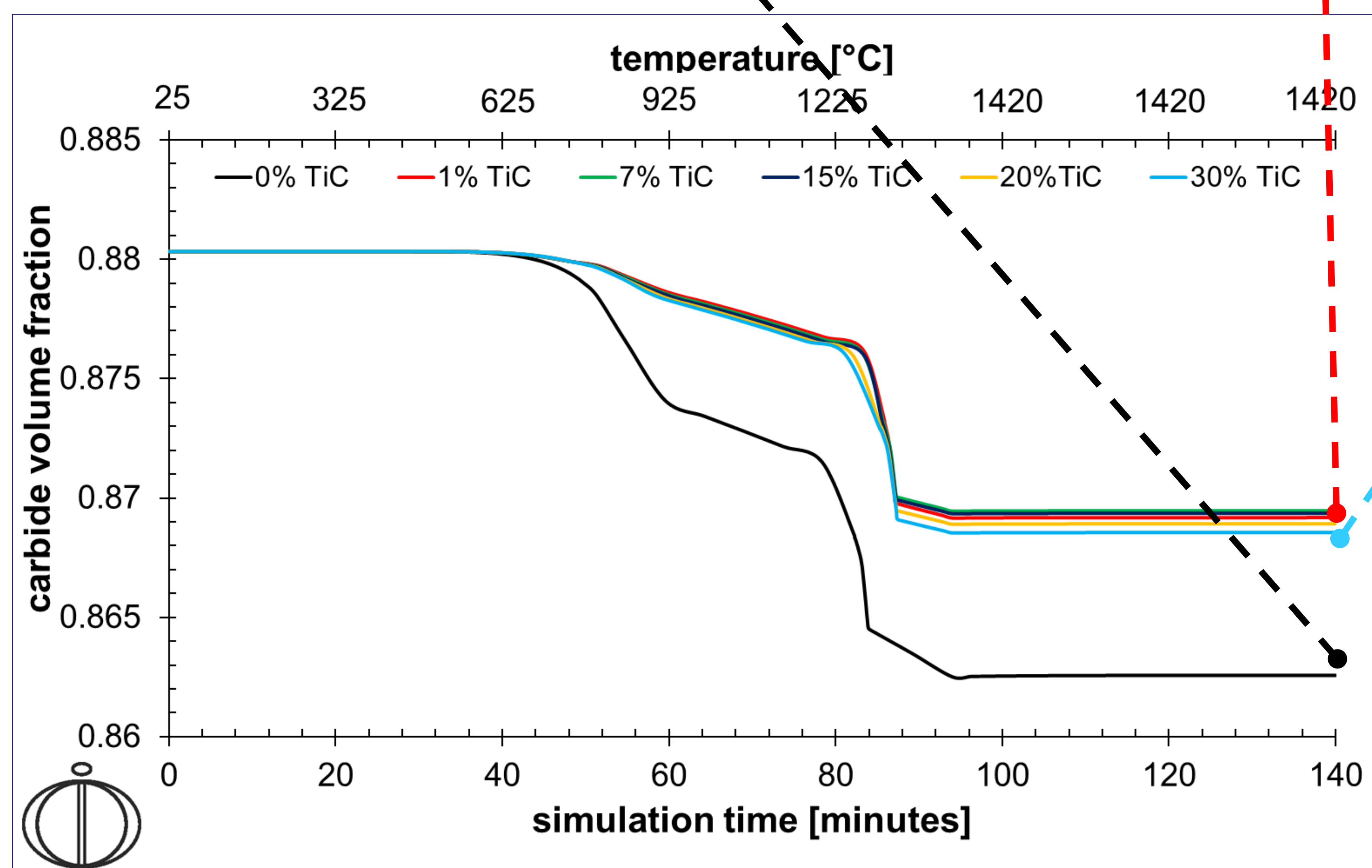
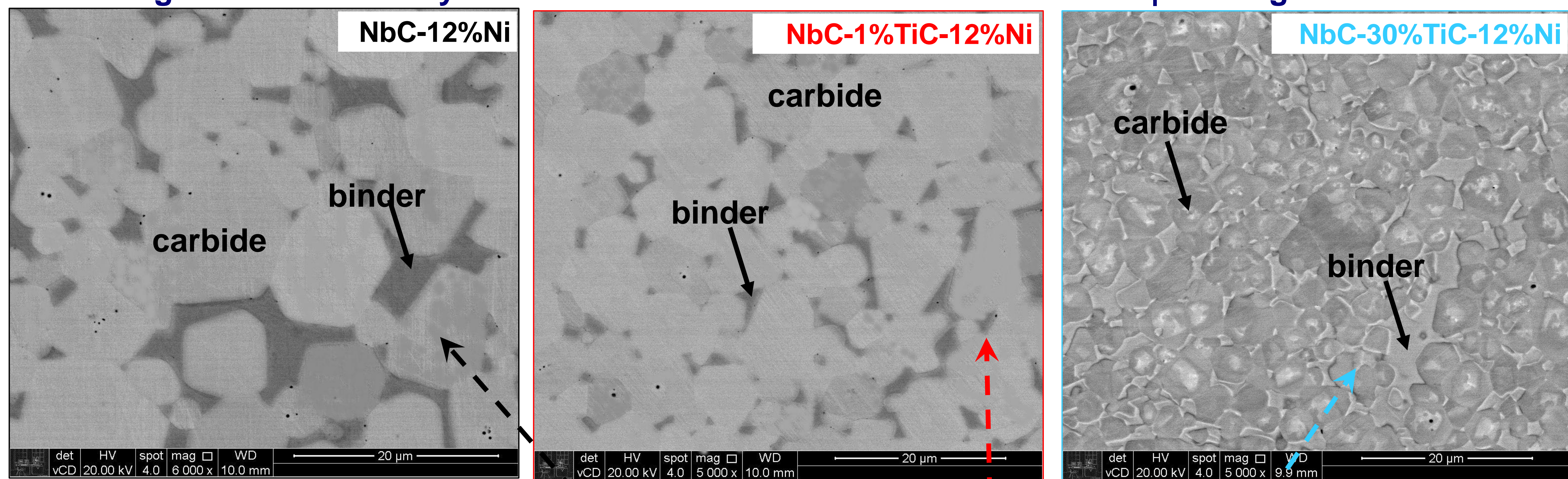
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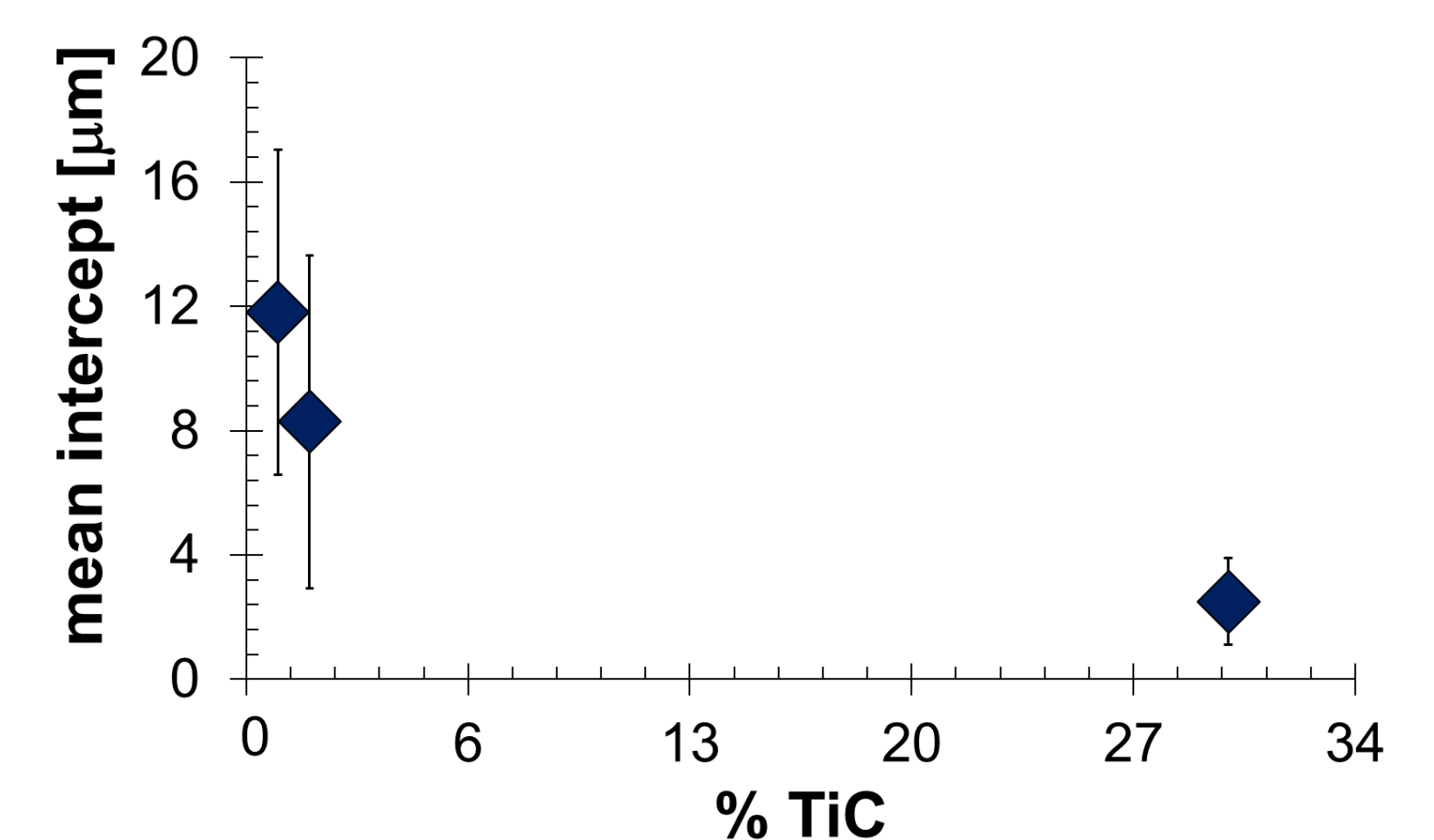
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NbC-Ni system has been hardly investigated to replace the well-established cement carbide WC (tungsten carbide). Previous researches showed a full densification. However, it was associated to an excessive NbC growing. TiC content effect in liquid phase sintering of NbC-12%Ni (mass percent) was simulated in DICTRA[®] software, using TCFE9 and MOBNI4 databases, to analyze the TiC effect as an inhibitor of carbide growth.

BSC images after DSC analysis at 1420 °C for 20 min. Heat rate: 15°C/min | Cooling rate: 10°C/min

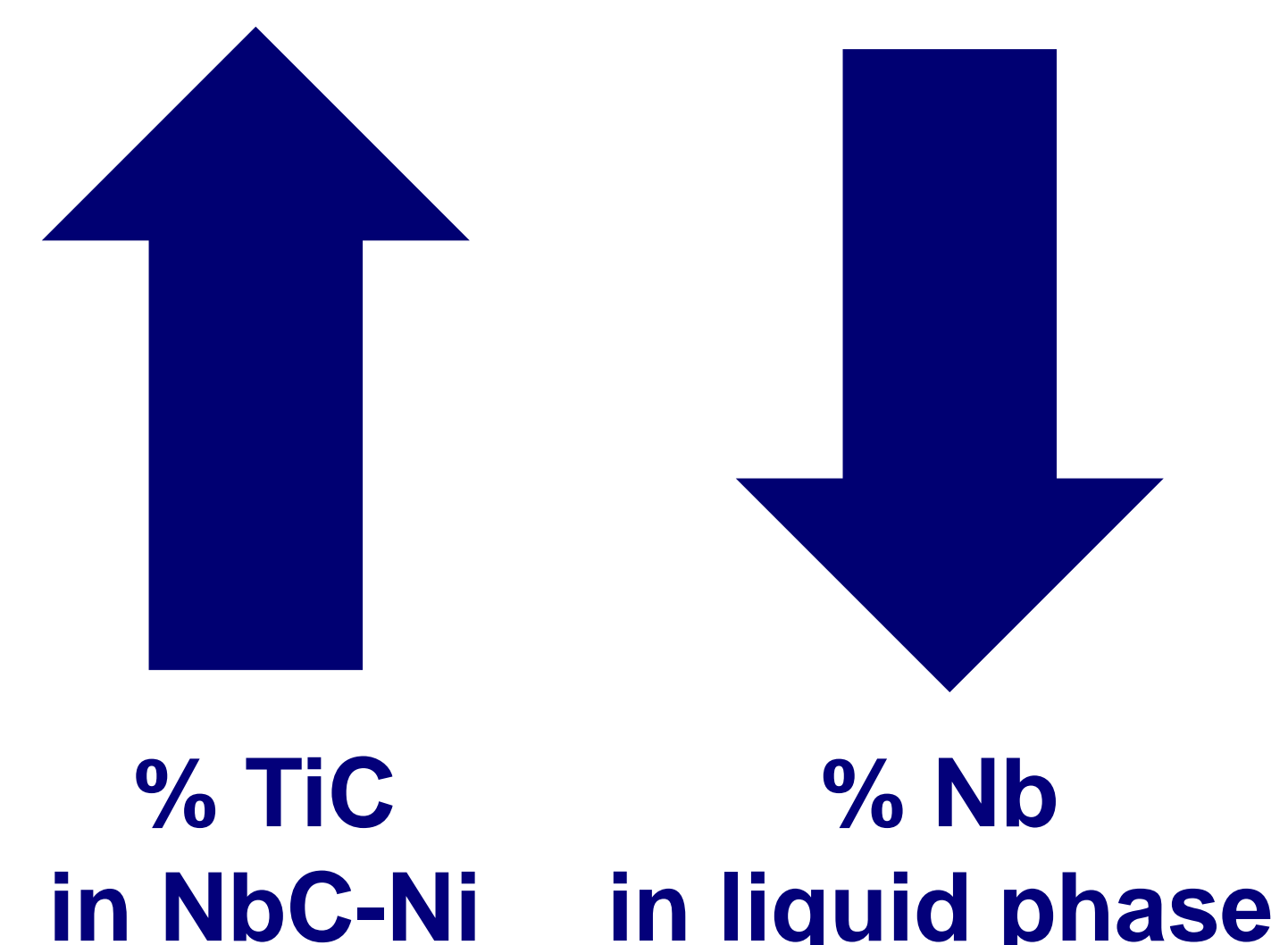


- DICTRA[®] simulation without TiC showed a higher carbide dissolution volume.
- TiC addition increase the time for carbide dissolution starting.
- BSC images showed a decrease in carbide size.



Chemical composition (mass percent) of liquid phase obtained by DICTRA[®].

	% Nb	% Ti	% C	% Ni
NbC-12%Ni	15,2	0	2,1	82,7
NbC-1%TiC-12%Ni	6,2	3,0	1,4	89,4
NbC-30%TiC-12%Ni	3,7	3,8	1,4	91,1



DICTRA simulation results showed a smaller carbide dissolution associated to a decrease in Nb content in liquid phase in systems with TiC, suggesting a prevention of dissolution reprecipitation carbide growth mechanism, and a decrease in carbide size as observed in BSC images.

Biographical Note

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