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

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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**

**Chemical composition (mass percent) of liquid phase obtained by Dictra®.**

- **NbC-12%Ni**
  - % Nb: 15,2
  - % Ti: 0
  - % C: 2,1
  - % Ni: 82,7

- **NbC-1%TiC-12%Ni**
  - % Nb: 6,2
  - % Ti: 3,0
  - % C: 1,4
  - % Ni: 89,4

- **NbC-30%TiC-12%Ni**
  - % Nb: 3,7
  - % Ti: 3,8
  - % C: 1,4
  - % Ni: 91,1

- 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.

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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