cbecimat26
26° Congresso Brasileiro de Engenharia e Ciência dos Materiais
22 a 26 de novembro de 2026
Costão do Santinho
Florianópolis-SC

Liquidus projection of the Cr-Nb-Zr system

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Indroduction

High-entropy alloys (HEAs) and refractory multi-principal element alloys have attracted increasing attention due to their potential for high-temperature structural applications, particularly in the aerospace industry. Understanding phase equilibria in the Cr–Nb–Zr system is essential for the thermodynamic design of low-density refractory alloys containing aluminum. This study investigates fifteen as-cast alloys using SEM, EDS, and XRD to establish the primary solidification fields and phase relationships in the ternary system.

Literature Review

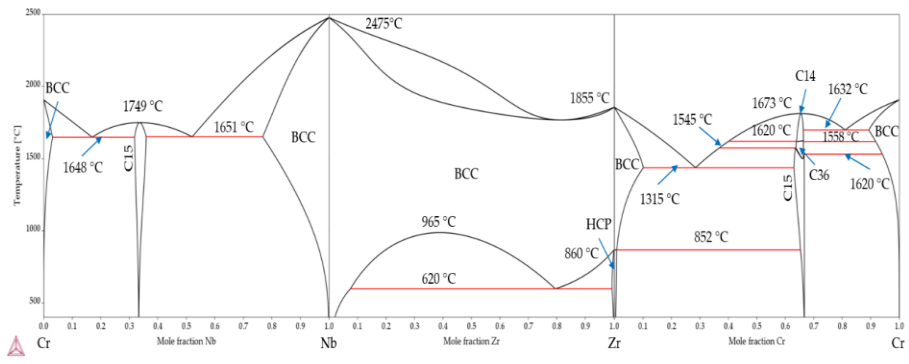


Fig. 1. Binary edges of the Cr-Nb-Zr system: (a) Cr-Nb[2], (b) Nb-Zr[2] and (c) Zr-Cr[3].

Materials and methods

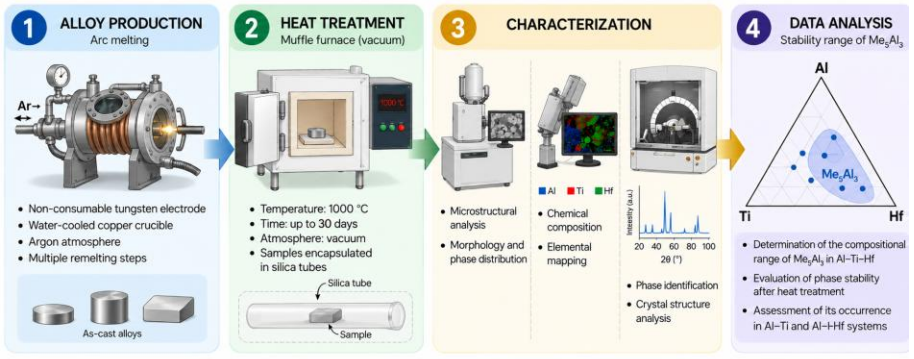
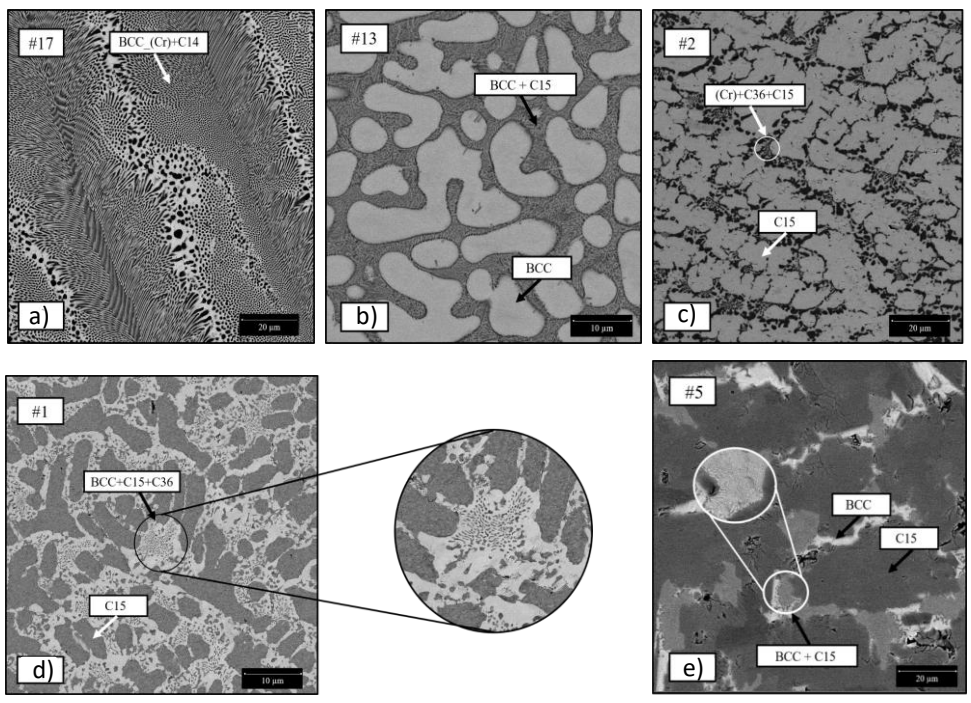
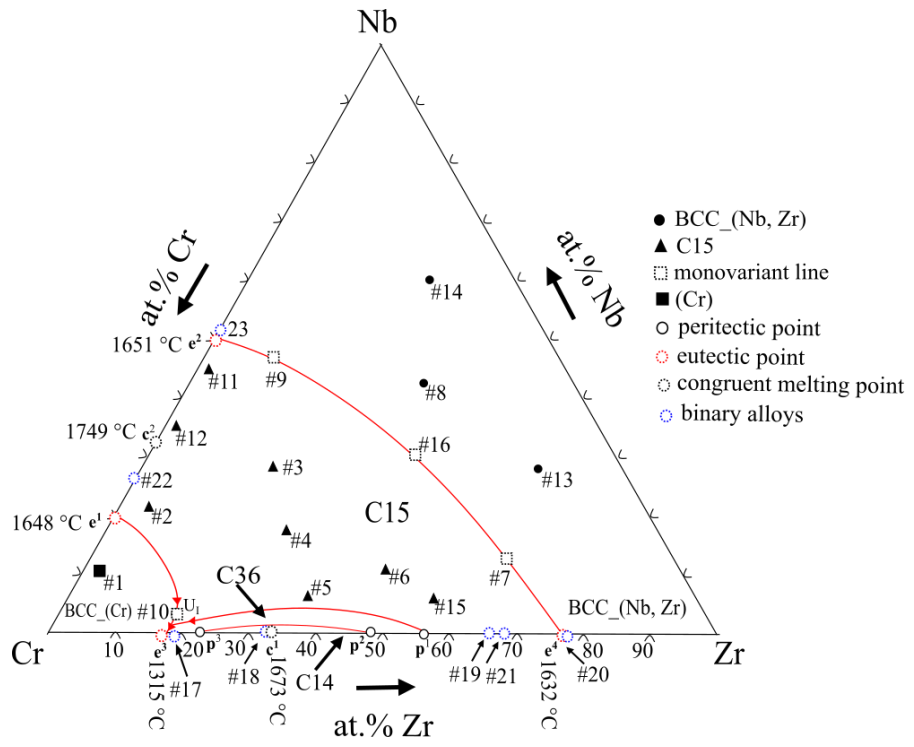


Fig.2. Schematic representation of the experimental procedure used in this work.

Results





Conclusions

- No ternary compounds were identified in the Cr–Nb–Zr system.
- The primary solidification fields of BCC, C15, C14, and C36 phases were experimentally established.
- The BCC phase exhibited the largest primary precipitation field.
- (UI) Liquid + C14 → BCC_(Cr) + C15

References

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Acknowledgments

CAPES
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