COMPARISON OF MICROSTRUCTURE AND MECHANICAL PROPERTIES AT DIFERENT LENGTH SCALES OF WC-Co HARDMETALS CONSOLIDATED BY BINDER JETTING 3D PRINTTING AND HIP.

L. Cabezas[1,3*], C. Berger[2], E. Jiménez-Piqué[1,3], A. Mateo[1,3], J. Pötschke[2], and L. Llanes[1,3]

[1] *CIEFMA – Department of Materials Science and Engineering, EEBE – Campus Diagonal Besòs, Universitat Politècnica de Catalunya - BarcelonaTech, 08019 Barcelona, Spain*

[2] *Fraunhofer Institute for Ceramic Technologies and Systems IKTS, 01277 Dresden, Germany*

[3] *Barcelona Research Center in Multiscale Science and Engineering, Campus Diagonal Besòs, Universitat Politècnica de Catalunya - BarcelonaTech, 08019 Barcelona, Spain*

*laura.cabezas.i@upc.edu

☒ Oral presentation ☐ Poster presentation

ABSTRACT

Additive Manufacturing (AM) is rapidly growing as a revolutionary technique. It provides an interesting ability to produce complex geometries, a key feature for enhancing performance and widening application fields of hardmetal components, limited characteristic for traditional processing techniques. Within this context, it is necessary to study the mechanical integrity of samples produced by AM [AMed] where it is expected to find characteristics linked to the shaping route followed, and study if they will have influence on the final behaviour regarding the mechanical properties expect for a specimen process by a traditional manufacturing route. This work aims to study the final microstructure, mechanical properties and layer assemblage at different length scales for a 12%wtCo–WC grade hardmetals of medium grain size consolidated by binder jetting 3DP and subsequent SinterHIP. In addition, compare this results with the ones obtained from a 12%wtCo–WC specimens process by means of a traditional technique like Hot Isostatic Pressing (HIP) using the same raw material like in the AMed specimens. Hardness Vickers at macro- and microlength scale as well as scratch tests, using different loads and indenter tips, are conducted on both type of samples. The results are analysed and discussed in terms of oriented layer-like material assemblage effects on microstructural variability, mechanical response determined by intrinsic physical behaviour of the material and feedstock used.