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MECHANICAL PROPERTIES OF W-Ti-B CERAMICS SYNTHETIZED IN DIFFERENT DIMENSIONS SCALES

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Refractory materials such as tungsten boride ceramics and their modifications by other metals alloying can be widely used for structural applications in severe environments where more efficient use of energy is a prime need. Owing to properties such as high strength and refractoriness, rationally low thermal expansion, and high electric and thermal conductivity these materials may be used as tool materials in machining but also due to very good antiradiation properties in nuclear or fusion reactors as a wall material for example. A diversity of applications causes a needs of investigations on this material produced in different scales from hundreds nanometres to centimetres.

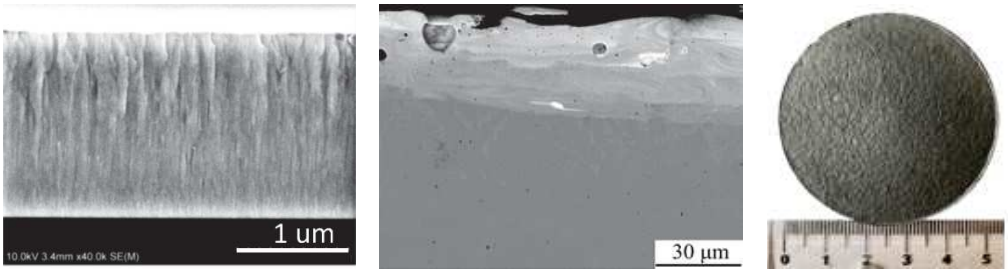

Fig. 1. W-Ti-B ceramics synthetized as MS film (a), ESA coating (b) and SPSed disk (c)

In this work the mechanical properties of W-Ti-B ceramics synthetised in form of magnetron sputtered (MS) films, electrospark alloyed (ESA) coatings with several dozen micrometres thickness and Spark Plasma Sintered (SPS) disks (fi=5 cm) are studied. Deposited with MS films are superhard and possess the highest density when in upper dimension scales the hardness decreases and XRD analysis showed different hexagonal structure. Due to the different method of producing of coatings, the adhesion of ESA coatings is much greater than in the case of films deposited with magnetron technology, while the surface roughness increases significantly.

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