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Study of the mechanical properties and the microstructure of magnetron sputtered Mo₂BC coatings¹ VILMA BURSİKOVA, PAVEL SOUCEK, PETR VASINA, LUKAS ZABRANSKY, Department of Physical Electronics, Faculty of Science, Masaryk University, JIRI BURSİK, Institute of Physics of Materials, Academy of Sciences of the Czech Republic — The aim of the present work was to prepare Mo₂BC films using magnetron sputtering. The studied films were deposited using a sputtering device equipped by four confocally arranged magnetrons accommodating 3 inch sputtering targets. All magnetron heads were aimed at a rotatable and biasable substrate holder that can be heated up to 750° C. Molybdenum, carbon and B₄C targets were co-sputtered simultaneously. Mo and B₄C targets were DC powered, while carbon target was connected to pulsed DC generator capable of pulsing up to frequency of 350 kHz. The pulsing frequency, bias and substrate temperatures were varied. The mechanical properties of layers were characterized by means of nanoindentation experiments using a Hysitron dual head TI950 triboindenter in both static and dynamic loading regime. The results of mechanical testing and XRD studies were correlated with microstructure observations by means of electron microscopy using a Tescan LYRA 3XMU SEM × FIB scanning electron microscope (SEM), a Philips CM12 STEM transmission electron microscope (TEM) and a JEOL 2010F high resolution TEM. Thin lamellar cross sections for TEM observations were prepared using a focused ion beam (FIB) in SEM.

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