

Triple sandwich design of multilayered (CrN/ZrN)/(Cr/Zr) hard coating with nanoscale architecture: Microstructure and composition(Article)

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Просмотр дополнительных организаций

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A novel multilayered (CrN/ZrN)/(Cr/Zr) coating of a 'triple sandwich' design was fabricated by the cathodic arc physical vapour deposition technique. The thickness of (CrN/ZrN)/(Cr/Zr) coating was 56 microns, and the thicknesses of constituent (CrN/ZrN) and (Cr/Zr) films were 1070 and 115 nm, respectively. Preferential crystallographic orientation for nitride layers was (200). This evidenced the formation of coherent interfaces between CrN and ZrN layers through the epitaxial stabilization of one material in the structure of another lattice. It was found that the diffraction peaks of CrN and ZrN shifted slightly to lower diffraction angle, which pointed to the presence of intrinsic stress in the experimental sample. The average grain size values for ZrN and CrN were 12.5 and 9.5 nm, respectively. The TEM results showed the formation of the face-centered cubic (fcc) phase in nitride layers. The substrate-coating region had a polycrystalline structure. The sample demonstrated relatively high micro- and nanohardness of 28.5 and 34 GPa, respectively. © 2019 IOP Publishing Ltd.