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An analysis of macroparticle-related defects on CrCN and CrN coatings in dependence of the substrate bias voltage[☆]

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ABSTRACT

Chromium nitride coatings with and without a carbon content being assigned as CrCN and CrN were prepared by cathodic arc evaporation. The effect of negative substrate bias voltages (10–300 V) on the microstructure, phase composition and morphology of the coating surface was studied. X-ray diffraction data show that almost all coatings crystallized in the cubic structure with (111) and (200) diffraction lines appearing only for low negative bias voltage and a (220) diffraction line being present for the coatings deposited at higher negative bias voltages. For CrN coatings obtained at –300 V a hexagonal structure was also observed. In case of CrCN coatings the (220) diffraction line shows much higher intensity than in case of CrN coatings and was significantly broadened. On the surface of the coatings a large number of macroparticles of different size was observed. An increase of bias voltage causes a reduction of the areal density of macroparticles and a decrease of the mean surface roughness R_a .

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