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Effect of the Si Contents and Microstructure on the Oxidation behavior between Ti-Si-N Coating Layers Prepared by DC Magnetron Sputtering Method

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The Ti-Si-N coating layers were codeposited on silicon wafer substrate prepared by a DC reactive magnetron sputtering technique using separatetitanium and silicon targets in N_2/Ar gas mixtures The oxidation behavior of Ti-Si-N coating layers has been investigated at various temperature and composition to understand the roles of silicon contents The Ti-Si-N coating layer at the Si content of 4 0 at% was oxidized relatively low temperature (600°C) At the Si contents of 10 0 at%, it was oxidized much lower than at the Si content of 4 0 at% It would be explained by the microstucture of Ti-Si-N coating layers The microstructure of Ti-Si-N coating layers were consisted of nano-sized crystallite TiN and amorphous Si_3N_4 matrix, which played efficient diffusion barrier a role against oxygen atoms. However, for the Si content of 27 3 at%, it was oxidized higher compared with Si content of 10 0 at% This phenomenon would be explained by the existence of free Si, which was not fully nitrified and easily outward diffused to the surface even low temperature and then the oxidized layer would be formed at the surface

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Comparative Study of TiN and TiAlN Film on WC-Co Using Impact Test

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TiN and TiAlN film were deposited on WC-Costeel substrates by an Arc Ion Plating(AIP) technique The crystallinity and morphology for the deposited filmswere characterzied by X-Ray Diffraction(XRD) and Scanning Electron Microscopy(SEM) The impact behaviors of the deposited TiN and TiAlN film were investigated with a ball-on-plate impact tester Beyond 10^2 impact cycle, TiAlN film showed superior impact wear volume compared to TiN film without fracture. On the other hand, both TiN and TiAlN films started to be partially failed between 10^2 and 10^3 impact cycle it could be suggested that the TiN film was failed relatively by plastic deformation during impact test, while TiAlN film was failed by elastic deformation by impact energy Above 10^3 impact cycle, TiN and TiAlN films showed similar impact behavior because of the substrate effect.