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Formation and characteristic of multiphase Ti-Cr-N films forms formed by cathodic arc ion plating

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Recently TiN, TiAlN and CrN hard coatings have adapted many industrial applications such as die, mold and cutting tools. Especially, the tribological characteristics of TiN and CrN have been known during the long time for hard, wear resistance application owing to their chemical as well as metallurgical stability and mechanical properties.

However, in terms of high-speed process, general hard coatings have been limited by decrease of hardness and oxidation resistance at upper 500°C. Therefore, super hard coatings with high hardness and good thermal stability have been emerging as very efficient films.

In previous work, hardness of Ti-Cr-N film was measured at a normal load of 0.5N.

As a result of measurement, this value is up to 30GPa.

In this study, Ti-Cr-N film was synthesized on steel substrate by cathodic arc ion plating system. We have characterized Ti-Cr-N using x-ray diffraction(XRD), secondary electron microscope(SEM).

Mechanical properties of Ti-Cr-N film were evaluated by micro-hardness, residual stress and scratch test. Ball-on-disk type sliding tribometer was carried out for film wear behavior.