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PATAMA VISUTTIPITUKUL : CHARACTERIZATION OF PLASMA-NITRIDED ALUMINIUM POWDER COMPACT THESIS ADVISOR : ASST.PROF.PRASONK SRICCHAROENCHAI (D.ENG) 82 p.p. ISBN 974-334-639-2

Effects of plasma nitriding process at 550 ^{o}C and 600 ^{o}C treated for 100 hours on physical properties: macrostructure, microstructure, relative density and mechanical properties: hardness, of commercial pure aluminium and aluminium 1wt.% titanium alloy specimens were studied.

For aluminium specimen, results from the experiment showed that the relative density is increased with the pressure applied for cold compact leading to increase hardness. Plasma nitriding process also resulted the strong effect on surface hardness increment of the specimen. This was due to the occurrence of aluminium nitride compounds on specimen's surface. Since the occurred aluminium nitride compounds were ceramic which owned high hardness, thus resulted the hardness increment. Results from the experiment further showed that, there were some cracks on the occurred aluminium nitride layer of the plasma nitrided specimen treated at 600 ^{o}C however no cracks were found when treated at 550 ^{o}C. This might due to thermal stress.

Considering matrix hardness, it was found that the matrix hardness of the plasma nitrided specimen, however decreased. This was due to crystallization leading to number of dislocation decrement. Obtained results also showed that surface hardness layers of the plasma nitrided specimen was generally less than 5 micrometer of the thickness, but they still clearly resulted the surface hardness increment.

For the aluminium-titanium alloy specimen, results from the experiment showed that titanium and Bulk Mechanical Alloying (BMA) increased the specimen hardness. This might due to the smaller grains when compared with cold compact treatment. However, effects of titanium and BMA on the layers of occurred aluminium nitride compound, were not found on plasma nitrided specimen surface.

Surface microstructure scanning by Scanning Electron Microscope (SEM) also showed incomplete decomposed alumina (Al_2O_3) nodules. Due to the high temperature, sintering was also clearly found in microstructure of the plasma nitrided specimens.

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