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Abstract
The purposes of this thesis are to develop the manufacturing parameters of DLC (Diamond-Like Carbon) coatings on Fe-Mn-Al-C alloys by means of inductively- coupled plasma ion plating technology. The effects of deposition of DLC coatings on the microstructural and mechanical properties of Fe-Mn-Al-C alloys are also investigated. It is focused to investigate the cohesive property, surface hardness and wear property in the present study.

Based on our experimental results, the following results are concluded. The surface hardness properties of various Fe-28Mn-8Al-1C alloys with different alloying elements are dependent on alloying elements, aging temperatures and aging times. In order to achieve excellent adhesive property and surface hardness of DLC coatings, it is necessary to change suitable parameters of ICP sputtering processes for different Fe-Mn-Al-C alloys. It shows that the higher bias-voltage of ICP sputtering processes is more suitable for the Fe-Mn-Al-C alloy with higher surface hardness, resulting in the DLC coating with higher surface hardness.

After performing the suitable manufacturing parameters to deposit DLC coatings on the various Fe-Mn-Al-C alloys, the surface hardness of various Fe-Mn-Al-C alloys increases significantly from about Hv200~450 to Hv1100~2400. The deposition of DLC coatings by ICP sputtering technology improves significantly the surface property and wear property of Fe-Mn-Al-C alloys. It is beneficial to expand the applications of Fe-Mn-Al-C alloys.
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