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The effect of aluminum oxide layer on the morphologies of Al coatings prepared by reactive sputtering JAE-IN JEONG, JI-HOON YANG, SEUNG-HYUN JANG, HYE-SUN PARK, Research Institute of Industrial Science & Technology, PLASMA APPLICATION TEAM — Aluminum oxide (Al-oxide) films have been deposited by reactive un-balanced magnetron sputtering and applied to the morphology change of Al thick coatings. First of all, Al-oxide sputtering conditions were optimized in reactive sputtering by varying the deposition parameters prior to coatings. The formation of Al-oxide film was confirmed from the binding energy shift measured by electron spectroscopy for chemical analysis. The Al-oxide films were applied to change the morphology of Al film. 3 types of coating structures were designed and prepared on Nd magnet by magnetron sputtering, and the structure change has been investigated. The coating structures consist of (1) single Al coating, (2) modified coatings having oxide or plasma treated layer in the middle of coating structure, and (3) Al/Al-oxide multilayer coatings. Surface and cross-sectional morphologies showed that Al/Al-oxide multilayer grew as a layered structure, and that very compact Zone III like structure were formed. X-ray diffraction peak showed that the crystal orientations of multilayer coatings were similar to that of the bulk powder pattern. Hardness increased drastically when the Al thickness was around $1\mu\text{m}$ in the Al/Al-oxide multilayer.

Jae-In Jeong
Research Institute of Industrial Science & Technology

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