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Author Ming-Che Tsai
Author's Email Address No Public.
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Abstract
Acrylic(PMMA) has the best impact resistant, pressure resistant, and good optical properties, so it is applied in the optics lens, sunglasses or windscreen of transportation. Titanium nitride has the characteristic of the high hardness and high wear resistant, is often used as a protective coating for corrosion and wear. It is a barrier material kind of frequently used in semiconductor process. The purpose of this paper is deposition titanium nitride films by magnetron sputtering on PMMA. Hope that acrylic has better value.
We deposited a layer of aluminum film between acrylic substrate and titanium nitride film first. The aluminum film has lower resistivity, and it is one of the materials of inter-layer that often be used. Try to improve the adhesion of the titanium nitride film and probe into influence of microstructure and mechanical properties of different thickness inter-layer of aluminum films to its titanium nitride films. In the experiment, we measured the deposition rate of aluminum film on PMMA and titanium nitride film on aluminum film by surface profiler (Alpha-step) first, and try to control the thickness of the aluminum films are 20nm, 40nm and 80nm, titanium nitride film is 80nm. The physical properties of the TiN/Al films are analyzed from AFM, SEM, XRD, mechanical properties are measured hardness of the films, and observation its change of the contact angle on the surface.
As the results of experiments, we find the surface roughness and hardness of the films are increased as the films increased gradually. The contact angle is 105° while the inter-layer thickness of aluminum films are 40nm, surface structure will change from hydrophilic to hydrophobic. Besides, we find preferred orientation is changed into the TiN（111）trend from the TiN（200）.
Key words : TiN/Al films, magnetron sputtering, contact angle, preferred orientation.
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