

이온빔 스퍼터링법에 의한 다층막의 표면특성변화

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The surface property change of multi-layer thin film on ceramic substrate by ion beam sputtering

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Abstract : The LTCC (Low Temperature Co-fired Ceramic) technology meets the requirements for high quality microelectronic devices and microsystems application due to a very good electrical and mechanical properties, high reliability and stability as well as possibility of making integrated three dimensional microstructures. The wet process, which has been applied to the etching of the metallic thin film on the ceramic substrate, has multi process steps such as lithography and development and uses very toxic chemicals arising the environmental problems. The other side, Plasma technology like ion beam sputtering is clean process including surface cleaning and treatment, sputtering and etching of semiconductor devices, and environmental cleanup.

In this study, metallic multilayer pattern was fabricated by the ion beam etching of Ti/Pd/Cu without the lithography. In the experiment, Alumina and LTCC were used as the substrate and Ti/Pd/Cu metallic multilayer was deposited by the DC-magnetron sputtering system. After the formation of Cu/Ni/Au multilayer pattern made by the photolithography and electroplating process, the Ti/Pd/Cu multilayer was dry-etched by using the low energy-high current ion-beam etching process. Because the electroplated Au layer was the masking barrier of the etching of Ti/Pd/Cu multilayer, the additional lithography was not necessary for the etching process. Xenon ion beam which having the high sputtering yield was irradiated and was used with various ion energy and current. The metallic pattern after the etching was optically examined and analyzed. The rate and phenomenon of the etching on each metallic layer were investigated with the diverse process condition such as ion-beam acceleration energy, current density, and etching time.

Key Words : LTCC, Ion beam sputtering, Multi-layer, Sputtering yield

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