

Comparison of etch characteristics of Ru thin films using CH₃OH/Ar and CH₄/O₂/Ar plasmas

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New kinds of memory devices which combine the advantages of current major memory devices have been required for the next generation. Among many possible candidates, magnetic random access memory (MRAM) has a great attention for the next generation. MRAM is combined with spintronic devices and standard silicon-based microelectronics. MRAM is composed of magnetic tunnel junction (MTJ) stack and complementary metal-oxide semiconductors. Ru has been used as a coupling layer and electrode in the MTJ stack because of its high dielectric constant and ferroelectricity. For the realization of MRAM devices, the etching of Ru films should be developed.

In this study, the etch characteristics of Ru thin films have been investigated by using CH₃OH/Ar, CH₄/Ar and CH₄/O₂/Ar gas. The effect of the ratio of gas mixture on the etch rate, etch selectivity, and etch profile were studied. Optical emission spectroscopy and X-ray photoelectron Spectroscopy were utilized to identify the etch mechanism.