

Fabrication and Characterization of Mo Thin Film for Superconducting Transition Edge Sensor

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We report on the fabrication and physical properties of superconducting Mo thin film. Mo thin films were deposited by DC magnetron sputtering with varying deposition condition. Patterning of the Mo film was done by chemical etching using a home-made etchant or a commercially-available etchant. Depending on the type of the etchant, the etched Mo surface showed different feature. To find the stress-free condition of the Mo film, dependence of the internal stress on the Ar pressure during sputtering was investigated. The internal stress has compressive at low Ar pressure and changes into compressive as pressure increases. The surface morphology of the Mo film was characterized using the atomic force microscopy and scanning electron microscopy. The surface roughness increases as the Ar pressure increases. The resistance-temperature curve of Mo film was measured using 3He-4He dilution refrigerator. Dependence of the resistance and critical temperature on the thickness of the Mo film was measured.

keywords : superconducting Mo thin film, sputtering, lithography, R-T curve