

ABSTRACT

TITLE OF INVENTION: PATTERNING PROCESS

A patterning process including the steps of:
forming a resist underlayer film on a substrate; forming a silicon-containing resist middle layer film on the resist underlayer film; forming a resist upper layer film on the silicon-containing resist middle layer film; forming a pattern in the resist upper layer film; forming a resist underlayer film pattern by etching multiple times while using the resist pattern as a mask; and subjecting the resist underlayer film pattern to plasma irradiation, where the composition for forming the resist underlayer film contains a resin having an aromatic ring, and a plasma used in the plasma irradiation etches the resist underlayer film less than an etching gas used in the step of forming the resist underlayer film pattern. This can provide a method for forming a resist underlayer film pattern that exhibits better edge roughness than a conventional organic underlayer film pattern by performing plasma irradiation.

[Fig.1]