

ABSTRACT

A hard mask film 2 provided on substrate 1 is formed by tin-containing chromium-containing material. In the chromium-containing material including tin, which forms the hard mask film 2, the etching resistance to fluorine-containing dry etching is equal to or higher than the etching resistance of the tin-free chromium-containing material, and it shows a significantly high etching rate as compared with a chromium-containing material free of tin under conditions for chlorine-containing dry etching. As a result, the time for chlorine-containing dry etching is shortened, and damage to a resist pattern is reduced. Thus, high-precision pattern transfer can be performed. The present invention provides a novel technique for increasing etching process-ability by increasing a dry-etching rate of a hard mask film made of a chromium-containing material while assuring a hard mask function of the hard mask film.

Fig. 1