CH_4/Ar 유도 결합 플라즈마를 이용한 Sapphire 기판의 식각 특성

엄두승, 김관하, 김동표, 양설, 김창일*
중앙대학교

Etching properties of sapphire substrate using CH_4/Ar inductively coupled plasma

Doo-Seung Um, Gwan-Ha Kim, Dong-Pyo Kim, Xue Yang and Chang-Il Kim*
Chung-Ang Univ.

Abstract : Sapphire (α-Al_2O_3) has been used as the substrate of opto-electronic device because of characteristics of thermal stability, comparatively low cost, large diameter, optical transparency and chemical compatibility. However, there is difficulty in the etching and patterning due to the physical stability of sapphire and the selectivity with sapphire and mask materials [1,2]. Therefore, sapphire has been studied on the various fields and need to be studied, continuously.

In this study, the etching properties of sapphire substrate were investigated with various CH_4/Ar gas combination, radio frequency (RF) power, DC-bias voltage and process pressure. The characteristics of the plasma were estimated for mechanism using optical emission spectroscopy (OES). The chemical compounds on the surface of sapphire substrate were investigated using energy dispersive X-ray (EDX). The chemical reaction on the surface of the etched sapphire substrate was observed by X-ray photoelectron spectroscopy (XPS). Scanning electron microscopy (SEM) was used to investigate the vertical and slope profiles.

Key Words : sapphire, plasma, CH_4/Ar, Al_2O_3, etch rate

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