

나노-펄스 노출에 따른 질소 첨가한 $\text{Ge}_2\text{Sb}_2\text{Te}_5$ 박막의 결정화 속도 평가

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An evaluation on crystallization speed of N doped $\text{Ge}_2\text{Sb}_2\text{Te}_5$ thin films by nano-pulse illumination

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Abstract : In this work, we report that crystallization speed as well as the electrical and optical properties about the N-doped $\text{Ge}_2\text{Sb}_2\text{Te}_5$ thin films. The 200-nm-thick N-doped $\text{Ge}_2\text{Sb}_2\text{Te}_5$ thin film was deposited on p-type (100) Si and glass substrate by RF reactive sputtering at room temperature. The amorphous-to-crystalline phase transformation of N-doped $\text{Ge}_2\text{Sb}_2\text{Te}_5$ thin films investigated by X-ray diffraction (XRD). Changes in the optical transmittance of as-deposited and annealed films were measured using a UV-VIS-IR spectrophotometer and four-point probe was used to measure the sheet resistance of N-doped $\text{Ge}_2\text{Sb}_2\text{Te}_5$ thin films annealed at different temperature. In addition, the surface morphology and roughness of the films were observed by Atomic Force Microscope (AFM). The crystalline speed of amorphous N-doped $\text{Ge}_2\text{Sb}_2\text{Te}_5$ films were measured by using nano-pulse scanner with 658 nm laser diode (power : 1~17 mW, pulse duration : 10~460 ns). It was found that the crystalline speed of thin films are decreased by adding N and the crystalline temperature is higher. This means that N-dopant in $\text{Ge}_2\text{Sb}_2\text{Te}_5$ thin film plays a role to suppress amorphous-to-crystalline phase transformation.

Key Words : $\text{Ge}_2\text{Sb}_2\text{Te}_5$, nano-pulse scanner, AFM, XRD, UV-VIS-IR spectrophotometer