EW-P005

PECVD 무선주파수 변화에 따른 전면 패시베이션 특성비교

이경동, 배수현, 김성탁, 박성은, 이해석, 김동환*

고려대학교, 신소재공학과, 서울시 성북구 안암동 5가, 대한민국

Plasma Enhanced Chemical Vapor Deposition (PECVD) 장치를 통하여 증착된 수소화된 질화막(SiNx:H)은 결정질 태양전지의 반사방지막과 패시베이션 층으로 널리 사용되고 있다. 본 연구에서는 PECVD 장치내에 플라즈마를 형성하는 무선주파수(Radio Frequency)를 다양하게 변화시켜 수소화된 실리콘 질화막의 경향성을 알아보고 각 무선주파수에서 최적화된 패시베이션층을 태양전지에 적용하여 그 특성들을 분석하였다. 다양한 무선주파수 범위는 고주파(High Frequency: 13.56 MHz), 저주파 (Low Frequency: 440 kHZ) 그리고 혼합주파(Dual Frequency: 13.56 MHz + 440 kHz)를 각각 이용하여 수소화된 질화막을 증착 하였으며 156 x 156 mm 대면적 결정질 실리콘 태양전지를 제작하여 비교하였다.

Keywords: PECVD, 실리콘 질화막, 무선주파수, 패시베이션

EW-P006

Planar Type Flexible Piezoelectric Thin Film Energy Harvester Using Laser Lift-off

Myoung-Sub Noh[1,3], Min-Gyu Kang[1], Seok Jin Yoon[2], and Chong-Yun Kang[1,3]

[1]Electronic Materials Research Center, Korea Institute of Science and Technology, 39-1 Hawolgok-Dong, Sungbuk-Ku, Seoul, 136-791, Republic of Korea, [2]Research Planning & Coordination Division, Korea Institute of Science and Technology, 39-1 Hawolgok-Dong, Sungbuk-Ku, Seoul, 136-791, Republic of Korea, [3]KU-KIST Graduate School of Converging Science and Technology, Korea University, Seoul 136-701, Republic of Korea

The planar type flexible piezoelectric energy harvesters (PEH) based on PbZr0.52Ti0.48O3 (PZT) thin films on the flexible substrates are demonstrated to convert mechanical energy to electrical energy. The planar type energy harvesters have been realized, which have an electrode pair on the PZT thin films. The PZT thin films were deposited on double side polished sapphire substrates using conventional RF-magnetron sputtering. The PZT thin films on the sapphire substrates were transferred by PDMS stamp with laser lift-off (LLO) process. KrF excimer laser (wavelength: 248nm) were used for the LLO process. The PDMS stamp was attached to the top of the PZT thin films and the excimer laser induced onto back side of the sapphire substrate to detach the thin films. The detached thin films on the PDMS stamp transferred to adhesive layer coated on the flexible polyimide substrate. Structural properties of the PZT thin films were characterized using X-ray diffraction (XRD) and scanning electron microscopy (SEM). To measure piezoelectric power generation characteristics, Au/Cr inter digital electrode (IDE) was formed on the PZT thin films using the e-beam evaporation. The ferroelectric and piezoelectric properties were measured by a ferroelectric test system (Precision Premier- II) and piezoelectric force microscopy (PFM), respectively. The output signals of the flexible PEHs were evaluated by electrometer (6517A, Keithley). In the result, the transferred PZT thin films showed the ferroelectric and piezoelectric characteristics without electrical degradation and the fabricated flexible PEHs generated an AC-type output power electrical energy during periodically bending and releasing motion. We expect that the flexible PEHs based on laser transferred PZT thin film is able to be applied on self-powered electronic devices in wireless sensor networks technologies. Also, it has a lot of potential for high performance flexible piezoelectric energy harvester.

Keywords: Energy harvester, PZT, flexible device, laser lift-off (LLO)