Residual Stress Analysis of Non-Polar GaN Epi-layers by GIXRD

Young-il Jang, Kyu-ho Park, Sung-ryong Cho*, Ho-ki Kwon*
Devices & Materials Lab., LG Electronics Institute of Technology, 16 Woomyeon-Dong, Seocho-Gu, Seoul 137-724, Korea
***LED Lab., LG Innoteck, 16 Woomyeon-Dong, Seocho-Gu, Seoul 137-724, Korea**

There have been many achievements in optic devices industries such as LEDs and LDs. It is true that the packaging techniques and the circuit design techniques are important, but it is inevitable to see the limits of the devices without epi characteristic improvements itself. Today's commonly used LEDs and LDs are composed of multi-stacked epi layers grown on C-plane sapphire or GaN free standing substrates. Epi layers can be easily grown on those symmetric plane substrates. But in that case there are several problems inevitably go with in. For example, when using C-plane as a substrate, the devices should suffer form strong polarization effect along the active layers where the radiative recombination occurred. This phenomenon is originated from the fact that GaN is wurzite structure material. Polarization effect can make not only the device's efficiency decreased but also the wavelength shifted to red region, because the electrons and holes are separated by this polarization effect so that the recombination efficiency is drastically decreased.

In order to reduce and avoid the polarization effect on the active region, the promised method is to use asymmetric, non-polar plane as a substrate. Already the performances of non-polar based device are revealed as outstanding by other groups. But the structural properties of these non-polar epi layers are not well understood. In point of the stress, there can be anisotropic stress state along grown axis. But the ways to measure and analysis the residual stress are not established very well. In this work, using Grazing Incidence XRD method and the modified $\sin^2\psi$ method, the in-plane and anisotropic mechanical properties of non-polar GaN epi layers will be discussed.

Permission to post abstract on the DXC web and affiliated web sites
→ Yes

Speaker's name, mailing address, phone number, fax number, and e-mail address
→ Name : Young-il Jang
Phone : +82-2-526-4090
e-mail : yijang@lge.com
Fax : Not available
Address : Devices & Materials Laboratory, LG Electronics Institute of Technology, 16 Woomyeon-Dong, Seocho-Gu, Seoul 137-724, Korea

Indicate your preferences
→ Oral presentation for DXC
→ Industrial Application of XRD session or Thin Film session
(I prefer the former.)

Indicate whether you intend to publish this paper in Advances in X-ray Analysis. If you do not plan on publishing, please explain why.
→ I will publish this paper.