



8th RAP Seminar

The 8th Seminar on RIKEN Center for Advanced Photonics

Language: Japanese

Date : Jan.10(Fri), 2014, 16:00 ~ 17:00

Location : Cooperation Center, 3F, W319, Wako Campus, RIKEN
(理研 和光キャンパス 研究交流棟3階会議室 W319)

Title : **Proposal of novel one-monolayer InN coherent quantum wells in a GaN matrix: Self-ordering process and new functionality**

GaNマトリクス中の超薄膜 1 分子層InN多重量子井戸
- 自己組織化形成と新規光デバイス展開の提案 -

Speaker : **Prof. Akihiko YOSHIKAWA**
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We have proposed and demonstrated novel coherent structure InN/GaN multiple quantum wells (MQWs) consisting of ultimately thin "1 ML" InN wells inserted in a GaN matrix. This has been achieved first by MBE under In-polarity growth regime on +c-GaN substrate and later by MOVPE also. The growth temperature for 1 ML InN insertion can be remarkably higher than conventional MBE and MOVPE cases due to the so called GaN matrix effect. This results in high quality MQW structure thanking to enhanced surface migration at higher growth temperatures. Furthermore, since the critical thickness of InN epitaxy on the c-plane GaN is about 1 ML and the proposed MQW structure can avoid new misfit dislocation generation at the heterointerface, resulting in high quality MQWs in principle.

It is shown that experimentally demonstrated 1 ML InN/GaN MQW structures indicate surprisingly higher structural quality/properties than those former-reported InN-based heterostructures. Self-ordering mechanism arising from immiscibility nature in between InN and GaN will also contribute for depositing sharp and atomically flat InN well.

The proposed MQW structure will have physically and practically important meanings leading to room temperature operating GaN-based excitonic devices and also efficient photonic devices working in wide wavelength range. Recent proposal for extending the MQWs to digital InGaN alloy and its application for III-N based solar cell will be also briefly discussed in this talk.

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