



Global COE Program  
"Center of Excellence for Advanced Structural and Functional Materials Design"

## Global Seminar

Date and time: **15:00-16:00, August 3, 2009**

Place: **Room R1-212**

Speakers and titles:

**Prof. Volkmar Dierolf**

(Physics and Materials Science & Engineering, Department of  
Physics, Lehigh University, USA)

**"Optical spectroscopy for nanoscale characterization of  
photonic structures and devices"**

This talk will include a brief introduction into Raman spectroscopy and optical spectroscopy of rare earth ions and how the obtained information can be used to determine the internal sub-micron scale properties of materials. The power of this experimental approach will be demonstrated for two material systems: (1)  $\text{LiNbO}_3$  and (2) GaN. For  $\text{LiNbO}_3$  it will be shown that the dynamics of the ferroelectric domain walls and their motions can be imaged with both Raman spectroscopy as well as the emission of Erbium ions. It will be shown that the presence of ferroelectric domain walls unexpectedly can be felt on several length scales ranging from the nm-scale to almost  $100 \mu\text{m}$ . For rare earth doped GaN, which has been considered for electroluminescence and spintronics devices, a strong incorporation-site dependence of the excitation mechanism of the rare earth ions will be demonstrated.

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