

平成 18 年 9 月 11 日

応用物理学会北海道支部 会員各位

応用物理学会北海道支部

### 講演会のお知らせ

下記講演会を開催いたしますので、多数ご参加下さいますようご案内申し上げます。

演題：First experiments on ultrafast piezospectroscopy in semiconductor nanostructures

講師：A.V.Akimov 氏 ( A.F.Ioffe Physical-Technical Institute, St.Petersburg, Russia )

日時：平成 18 年 9 月 15 日 ( 金 ) 15:30 ~ 17:00

場所：北大工学部応用物理学専攻会議室(A3-62)

後援：応用物理学会北海道支部 ( 共催団体：学振 )

### 講演の要旨

A basic principle of many novel concepts for solid state devices is coherent control of the energy of the electronic excitations on a picosecond time scale. However, an ultrashort time scale precludes tools such as application of external electromagnetic field or temperature pulses. Also piezospectroscopic effect (energy shift of the electron resonance under uniaxial strain), which has been demonstrated to result in sizeable shifts of electronic resonances when applied statically, cannot be varied fast enough.

Therefore we have used an internal strain pulses to control the electron energy in a nanostructure [1]. As a model excitation we have chosen the exciton resonance in a semiconductor quantum well which was deposited on a GaAs substrate. For generating the strain pulse a 100 nm thick metal transducer layer was attached to the substrate. This metal film was hit by intense laser pulse and due to thermoelastic effect a strain pulse with duration  $\sim 10$  ps and amplitude up to 0.1% was injected into a substrate. This strain pulse travels strongly directed through the crystal towards the quantum well generating at each momentary position a "nano-earthquake". When the quantum well is hit by this "earthquake", the exciton resonance is shifted by a few meV on a ps time scale, as demonstrated in the present work by means of optical spectroscopy. At high excitation power formation of the acoustic solitons is clearly observed.

[1]. A. V. Akimov et. al., Phys. Rev. Lett. 97, 037401 (2006).

世話人 西口 規彦

北海道大学工学研究科応用物理学専攻

電話：011-706-6713 nn@eng.hokudai.ac.jp