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：Advances in Applications of Picosecond Acoustic Interferometry for Nanoscale Imaging
講師：Vitalyi Gusev 氏
（Laboratoire d’ Acoustique de l’ Universite du Maine）
日時：平成 31 年 4 月 25 日（木） 16:30〜17:30
場所：北海道大学工学部応用物理学専攻会議室（A3-62）
主催：応用物理学会北海道支部

講演の要旨

Picosecond acoustic interferometry is an all-optical experimental technique based on ultrafast lasers applied for generation and detection of coherent acoustic pulses on time duration of pico-seconds and length scale of nanometers [1]. In transparent materials scattering of the probe laser beam by the coherent acoustic phonons permits imaging of sample inhomogeneties. The transi-ent optical reflectivity of the sample recorded by the probe beam as the acoustic nanopulse propagates in space contains information on the acoustical, optical, and acousto-optical parame-ters of the material under study [2-5]. The experimental method is based on a heterodyning where weak light pulses scattered by the coherent acoustic phonons interfere at the photodetec-tor with probe light pulses of significantly higher amplitude reflected from various interfaces of the sample. The picosecond acoustic interferometry imaging is based on Brillouin scattering and has the potential to provide all the in formation that researchers in materials science, physics, chemistry, biology etc., get with classic frequency-domain Brillouin scattering of light. It can be viewed as a replacement for Brillouin scattering and Brillouin microscopy in all investigations where nanoscale spatial resolution is either required or advantageous. We review applications of picosecond acoustic interferometry for imaging of nanoporous films [2,4], ion-implanted semi-conductors [3] and dielectrics [6], texture in polycrystalline materials [7-9] and inside vegetable and animal cells [10,11], temperature distributions in liquids [12], and for monitoring the trans-formation of nanosound caused by nonlinearity [13,14] and focusing [15]. We also discuss the perspectives and the challenges for the future [16].References:[1] C. Thomsen, et al., Opt. Comm. 60, 55 (1986). [2] C. Mechri, et al., Appl. Phys. Lett. 95, 091907 (2009). [3] A. Stei-gerwald, et al., Appl. Phys. Lett. 94, 111910 (2009). [4] A. M. Lomon osov, et al., ACS Nano 6, 1410 (2012). [5] V. E. Gusev, et al., J. Appl. Phys. 110, 124908 (2011). [6] D. Yarotski, et al., Appl. Phys. Lett. 100, 251603 (2012). [7] S. M. Nikitin, et al., Sci. Rep. 5, 9352 (2015). [8] M. Kuriakose, et al., Ultrasonics, 69, 201 (2016). [9] M. Kuriakose, et al., Phys. Rev. B 96, 134122 (2017). [10] S. Danworaphong, et al., Appl. Phys. Lett. 106, 163701 (2015). [11] F. Perez-Cota, et al., Appl. Opt. 54, 8388 (2015). [12] I. Chaban, et al., Rev. Sci. Instr. 88, 074904 (2017). [13] V. E. Gusev, J. Appl. Phys. 116, 064907 (2014). [14] C. Klieber, et al., Phys. Rev. Lett. 114, 065701 (2015). [15] T. Dehoux, et al., Light: Science & Applications, 5, e16082 (2016). [16] V. Gusev and P. Ruello, Appl. Phys. Rev. 5, 031101 (2018).

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