Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Cantilever detection of electron spin resonance in the terahertz region HIDEYUKI TAKAHASHI, Organization of Advanced Science and Technology, Kobe University, EIJI OHMICHI, Graduate School of Science, Kobe University, HITOSHI OHTA, Molecular Photoscience Research Center, Kobe University
— Electron spin resonance (ESR) is used in a wide range of research areas. Most commercially available spectrometers operate at the X- band (∼10 GHz). However, high-frequency ESR (>100 GHz) has many advantages, such as the high spectral resolution, the ESR detection beyond the zero-field splitting etc. We report the cantilever detection of electron spin resonance in the terahertz region. This technique mechanically detects ESR as a change in magnetic torque that acts on the cantilever, while the conventional method, such as the cavity perturbation and the transmission method, directly measures the absorption of electromagnetic wave power. Backward wave oscillators (BWO) were used as THz-wave sources. Despite the small sample mass ($m = 4$ μg) and low power output of the BWO ($P < 4$ mW above 1 THz), we observed ESR absorption of Co Tutton salt, $Co(NH_4)_2(SO_4)_2{\cdot}6H_2O$, in frequencies of up to 1.1 THz. Spin sensitivity was estimated to be the order of 10^{11}-10^{12} spins/gauss above 1 THz. This technique will not only broaden the scope of ESR spectroscopy application but also lead to high-spectral-resolution ESR imaging.
[1]H. Takahashi, E. Ohmichi and H. Ohta, Appl. Phys. Lett. **107**, 182405 (2015).

Hideyuki Takahashi
Organization of Advanced Science and Technology, Kobe University

Date submitted: 05 Nov 2015 Electronic form version 1.4