

Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

A coupled optoelectronic oscillator by using an actively mode-locked external-cavity diode laser¹ TAI HYUN YOON, JEONGMIN LEE, GWANG HOON JANG, DUSEONG YOON, MINSOO SONG, Dept. of Physics, Korea University, Seoul 136-713, Korea — We propose and demonstrate a novel coupled optoelectronic oscillator consisting of an actively mode-locked external-cavity diode laser (ECDL) at 852 nm and a microwave feed-back loop. We show that the oscillation frequency can be precisely tuned by varying the feedback phase and the frequency tuning slope depends only on the reflectivity of the output coupler of the ECDL. In the proof-of-principle experiment, we found that the phase noise spectrum and frequency stability of the microwave carrier frequency at 2.298 GHz was dominated by the quality factor of the ECDL cavity, i.e., the Leeson frequency of the optical resonator. This feature could be understood since the Leeson frequency is inversely proportional to the Q -value of the feed-back resonator. Our COEO has a great potential as a compact and portable optoelectronic oscillator that generates a highly-stable microwave reference frequency, for instance, by stabilizing the repetition frequency to the hyperfine transition of Cs atoms at 9.2 GHz.

¹This research was supported by NSL (National Space Lab) program through the Korea Science and Engineering Foundation funded by the Ministry of Education, Science and Technology (2008-03197).

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Date submitted: 22 Jan 2009

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