

Ultrahigh-frequency mode-locked pulse generation with an all-optical semiconductor gate

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The purpose of this research is to develop an innovative optical pulse generation scheme, which was first experimentally proposed in 2001 by one of the present authors¹. Relying on an original ultrafast, all-optical semiconductor gate (DISC)² and other chemically stable optics instead of conventional nonlinear mode-locking mechanisms, we are studying this brand-new scheme and trying to realize monolithically integrated, mass-producible, stable, precise, and universal pulse sources that generate transform-limited optical pulses. Regarding the nonlinear gate inside the generator, 1.5-ps, 160-GHz gated waveforms have experimentally been observed since 2000².

In this symposium, the latest research results in this Course of Coherent Optical Science are presented where the *threshold condition* for generating our nearly-transform-limited mode-locked 1555-nm, 5-ps, 10-GHz pulses was clearly observed for the first time³.

References: 1) Y. Ueno et al., Appl. Phys. Lett. **79** (2001) 2520, 2) Y. Ueno et al., Jpn. J. Appl. Phys. **39** (2000) L806, 3) R. Suzuki et al., *just published in digest of CLEO-Pacific Rim*, paper number CFM1-4, Tokyo, July 11-15, 2005.