



Applied Physics & OSA  
Optics Seminar

## Extreme Terahertz sources

Professor Roberto Morandotti

Energy, Materials and Telecommunications (EMT) Center,  
National Institute of Scientific Research (INRS), Varennes, QC, Canada

**Abstract:** We have recently demonstrated the generation of  $\mu\text{J}$ -level, single-cycle terahertz pulses by optical rectification from a large-aperture ZnTe single crystal wafer. Energies up to  $1.5 \mu\text{J}$  per pulse and a spectral range extending to 3 THz were obtained using a 100 Hz Ti:Sapphire laser source and a 75-mm-diameter, 0.5-mm-thick, (110) ZnTe crystal, corresponding to an average power of  $150 \mu\text{W}$  and an energy conversion efficiency  $3.1\text{E-}5$ . We have also demonstrated real-time imaging of the focused terahertz beam using a pyroelectric infrared camera. Such a source can contribute to open up the field of nonlinear optics in the THz regime. In particular, we have recently shown the possibility of using open-aperture Z-scan like measurements to perform time resolved characterization in a n-doped InGaAs thin layer using intense few-cycle terahertz pulses. We observed a significant bleaching of the terahertz pulse absorption attributed to terahertz-electric-field-induced inter-valley carrier scattering.

**Dr. Roberto Morandotti**, professor at INRS since 2003, has a broad knowledge in the fabrication of semiconductor, ferroelectric and glass integrated waveguides and in the use of various characterization techniques in optics. His main achievements to date are in nonlinear optics, where he has worked in the field of spatial and temporal nonlinear localizations, dealing in particular with discrete solitons, surface solitons and spatio-temporal light bullets. More recently, his research interests have broadened to encompass new topics of investigation, including linear and nonlinear magneto-optics and nonlinear THz Spectroscopy. He has served as the General Chair of the NP2007 OSA Topical Meeting, as a Program Chair for NLGW 2005 OSA Topical Meeting as well as a Sub-Committee Chair for various other OSA, SPIE, IEEE and LEOS meetings.

Anyone interested in meeting with the speaker should contact **Avi Zadok**, [avizadok@caltech.edu](mailto:avizadok@caltech.edu)

**Tuesday, February 24<sup>th</sup>**

**4:00pm-5:00pm.**

**Watson 104**

*Refreshments will be available in the Watson Lobby at 3:45pm*