INRS overcomes a hurdle in the development of terahertz lasers

7 March 2013

Provided by INRS

Dr. Roberto Morandotti and his team at the INRS Énergie Matériaux Télécommunications Research Centre have developed a device that is critical to the use of terahertz (THz) sources for a variety of applications.

Their electromagnetic non-reciprocal isolator is the subject of a recent article in *Nature Communications*, showing just how important this new development is. Until now, no isolator existed that was effective in the THz region of the spectrum, a situation that held back the development of certain technologies. The new device paves the way for applications using terahertz frequencies including the development of terahertz lasers and amplifiers, to which the scientific community is currently devoting much attention.

Recent advances in the field of THz wave sources and detectors have spurred the development of imaging, communications, and spectroscopy technologies—these last used in the detection of explosives. All these technologies use electromagnetic spectrum bandwidths for which current isolators are not suitable.

An isolator is needed to prevent reflected waves from distorting measurements or damaging other components. Thus the absence of a workable isolator represented a major limitation to the use of THz wave sources. Dr. Morandotti's work at INRS provides the first solution to this problem, using a strontium iron oxide ($SrFe_{12}O_{19}$) magnet, which has the additional benefit of requiring no external magnetic field.

More information: The article, entitled "A magnetic non-reciprocal isolator for broadband terahertz operation," appeared March 5, 2013, in *Nature Communications* (4:1558, DOI: 10.1038/natcomms2572).