**Novel light sources based on femtosecond laser written photonic structures**

**Presenter:** Dr. Alex Fuerbach, Macquarie University, Sydney, Australia

**Abstract:**

The femtosecond laser direct-write technique enables the fabrication of fully integrated three-dimensional miniaturised optical components in virtually any transparent dielectric medium. By tightly focussing a femtosecond laser beam inside a block of glass or inside the core of an optical fibre, a highly localised and permanent change of the refractive index can be induced. This provides the basis for the rapid fabrication of fully integrated 3D photonic structures and devices that are not only compact and lightweight but also inherently robust since they are embedded within the bulk material.

In this talk, I will focus on the application of the femtosecond laser direct-write technique for the fabrication of novel light sources. In particular, I will discuss the development of ultra-compact and broadband mid-infrared sources that are miniaturised and robust, thus enabling integration of those sources into field transportable systems for point of care diagnostics. In addition I will report on a novel core-scanning technique for the fabrication of fibre Bragg gratings (FBGs) with virtually arbitrary reflection and dispersion profiles and on integrated pump reformatting chips for diode pumped lasers.

**Biodata:**

Alex Fuerbach was born in Vienna, Austria. He received his PhD from Vienna University of Technology in 2001 in the group of Prof. Ferenc Krausz who pioneered the field of attosecond science. Alex later joined Femtolasers Produktions GmbH in Vienna as a Research Scientist, were he was responsible for the development of novel ultrashort-pulsed Ti:Sapphire oscillators. In 2004 he became a Research Fellow at the University of Sydney in Australia, working on nonlinear pulse propagation effects in photonic band-gap fibres.

Alex is now Senior Lecturer at Macquarie University where his research is focused on utilising femtosecond laser pulses to induce 3-D refractive index modifications in passive and doped glasses as well as in optical fibres. He is also Director of Education and Training for the ARC Centre of Excellence for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS).