

# Recent developments in bulk waveguide devices fabricated at Macquarie University using ultrafast laser direct-write techniques

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**Talk abstract:** In 1996, it was demonstrated that focussed infrared femtosecond laser pulses can induce a local internal increase in the refractive index of bulk transparent glasses. This discovery offered unique opportunities for the fabrication of arbitrary 3D photonic waveguide devices inside a wide range of materials simply by translating a sample through the focal point of a focussed femtosecond laser beam. Not only can this direct-write technique be carried out rapidly, it is readily compatible with existing fibre systems, it does not require a lithographic mask and it can be conducted in a regular laboratory environment with the minimum of sample preparation. This presentation explores the contributions, carried out at the CUDOS at Macquarie University, to the field of femtosecond laser direct-written waveguide devices and an outlook into future investigations. In particular, studies into writing polarisation, directional couplers, waveguide Bragg gratings, waveguide amplifiers and waveguide laser oscillators will be presented.

**Speaker biography:** Dr Martin Ams received the B.Sc. degree in physics and the Ph.D. degree in optical laser physics from Macquarie University, Sydney, NSW, Australia, in 2001 and 2008, respectively. He is currently a Research Associate at the MQ Photonics Research Centre and the Centre for Ultrahigh bandwidth Devices for Optical Systems (CUDOS), Macquarie University. His current research interests include femtosecond laser direct-writing of photonic waveguide devices for use in telecommunication, quantum information and biophotonic applications. He has over six years of photonics experience and is the author or co-author of more than 30 journal and conference papers.