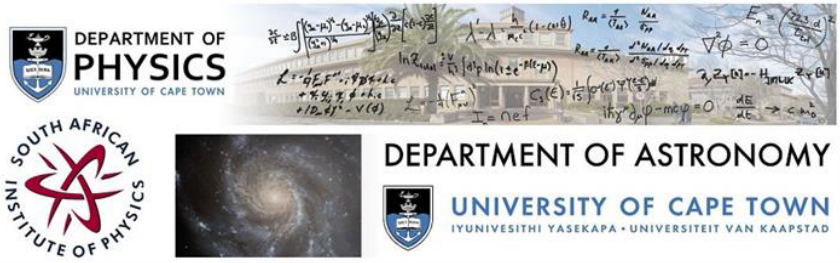

Contribution ID: **454** Type: **Poster Presentation**

Determination of thin silicon sample thicknesses using linear and nonlinear optical methods

Wednesday, 6 July 2016 16:10 (1h 50m)

Abstract content
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Silicon (Si) continues to be a prominent material in microelectronics, optoelectronic, micromechanics, solar cells, and increasingly in photonics. Delicate Si devices can be shaped and/or modified by laser technology providing many kinds of controlled methods for e.g. doping, annealing, crystallization and ablation. Proper processing requires, however, a detailed understanding of the linear and nonlinear optical phenomena in Si. Some of the nonlinear phenomena may occur simultaneously and be difficult to discriminate like coherent two-photon absorption (TPA), free carrier absorption (FCA), and thermally induced absorption enhancement (TAE). In this work, a femtosecond (fs) Ti:sapphire laser tuned at 800 nm is applied to investigate the linear and nonlinear optical behaviours of thin Si samples in the 10 μm to 30 μm range by measuring the average laser power of the fs pulse train transmitted through the membranes as a function of the incident laser power. The experimental findings help to determine the thickness of the Si samples using a linear and FCA absorption methods, respectively.

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Primary author: Mr NDEBEKA, Wilfrid (Laser Research Institute, University of Stellenbosch)

Co-authors: Dr STEENKAMP, Christine (University of Stellenbosch); Prof. ROHWER, Erich (University of Stellenbosch); Prof. STAFAST, Herbert (Leibniz Institute of Photonic Technology, Albert-Einstein-Str. 9, 07745, Jena, Germany); Dr NEETHLING, Pieter (Laser Research Institute, University of Stellenbosch)

Presenter: Mr NDEBEKA, Wilfrid (Laser Research Institute, University of Stellenbosch)

Session Classification: Poster Session (2)

Track Classification: Track C - Photonics