**SAIP2012** 



Contribution ID: 252

Type: Oral Presentation

# A Study of Photo-Generated Charge Carrier Density in Dye Sensitized solar cells by Microwave Reflectance

Thursday, 12 July 2012 14:10 (20 minutes)

## Abstract content <br> &nbsp; (Max 300 words)

The Microwave technique is now a well established tool for contactless measurements of charge carriers in semiconductors. In Dye sensitized solar cells the transport mechanism is not yet fully understood, as there is a need to quantify the relationship between the photomodulated reflectivity and conductivity of the porous TiO2 semiconductor layer. Interpretation of the experimental results requires a relationship between the reflectivity and conductivity to be established. In addition to calculating this proportional factor, we also want to quantify the electron transport in DSSCs, as a better understanding of the transport mechanism could lead to improve device efficiency. A 3D simulations model was developed for the study of photogenerated charge carriers by microwave reflectance techniques in DSSCs. This model is able to reproduce several features of the experimental results. Comparison of the calculated microwave reflectance changes with the experimentally measured data revealed that the experimental response was much larger than expected.

#### Bibliography

- 1. Kunts M. and Beck G. The study of charge carrier kinetics in semiconductors by microwave conductivity measurements. JAP, Vol 60, 1986.
- Konstantinova E.A., Timoshenko V.Y., Kashkarov P.K., Kytin V.G., Gaivoronskii V.Y., Porteanu H., Dittrich T., and Koch F. Microwave Photoconductivity in nanocrystastalline porous titanium oxide subjected to pulse laser excitation., Semiconductor, 36(3): 319-324, 2002
- 3. Ratacadecho P., Aoki K., and Akahori M., A numerical and experimental investigation of the modeling of microwave melting of frozen packed beds using rectangular wave guide. International communication in heat and mass transfer, Vol 28, No 6, p 751 -762, 2001

### Apply to be<br> consider for a student <br> &nbsp; award (Yes / No)?

NO

# Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?

NO

Primary author: Dr MALUTA, Nnditshedzeni Eric (University of Venda)

Co-author: Prof. WALKER, Alison (University of Bath)

**Presenter:** Dr MALUTA, Nnditshedzeni Eric (University of Venda)

Session Classification: Applied Physics Forum

Track Classification: Track F - Applied Physics