



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

Contribution ID: 197

Type: **Poster Presentation**

## Phonon confinement analysis of carbon doped titanium dioxide quantum dots

*Tuesday, 10 July 2012 17:30 (2 hours)*

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

Carbon doped titanium dioxide quantum dots have been synthesized by ultrasonic spray pyrolysis technique using titanium tetra ethoxide as the precursor solution. High-resolution transmission electron microscopy on the quantum dots shows difference in lattice spacing in the quantum dot structures prepared to be  $-2.02 \text{ \AA}$  for the ultrasonic spray pyrolysis quantum dots. The most probable particle size is 3.11 nm and the carbon doping only changes the lattice spacings of the  $\text{TiO}_2$  lattice; the most predominant plane is the (101) in  $\text{TiO}_2$  reciprocal lattice as determined from the fast Fourier transform of most of the particle images. Raman spectroscopy confirms the  $\text{TiO}_2$  polymorph to be anatase with the intense phonon frequency at  $153 \text{ cm}^{-1}$  blue-shifted from  $143 \text{ cm}^{-1}$  due to both carbon doping and particle size. A modified phonon confinement model for quantum dots has been used to extract phonon dispersion and other parameters for anatase.

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

Yes

### Level for award<br>&nbsp;(Hons, MSc, <br> &nbsp; PhD)?

PhD

### Main supervisor (name and email)<br>and his / her institution

Prof. EL Meyer emeyer@ufh.ac.za, University of Fort Hare

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

Yes

**Primary authors:** Prof. MEYER, Edson (University of Fort Hare Institute of Technology (FHIT), University of Fort Hare, Private Bag X1314, Alice 5700, Republic of South Africa); Mr RAYMOND, Taziwa (University of Fort Hare Institute of Technology (FHIT), University of Fort Hare, Private Bag X1314, Alice 5700, Republic of South Africa)

**Co-author:** Dr CHINYAMA, Kaumba (University of Fort Hare Institute of Technology (FHIT), University of Fort Hare, Private Bag X1314, Alice 5700, Republic of South Africa)

**Presenter:** Mr RAYMOND, Taziwa (University of Fort Hare Institute of Technology (FHIT), University of Fort Hare, Private Bag X1314, Alice 5700, Republic of South Africa)

**Session Classification:** Poster Session

**Track Classification:** Track F - Applied Physics