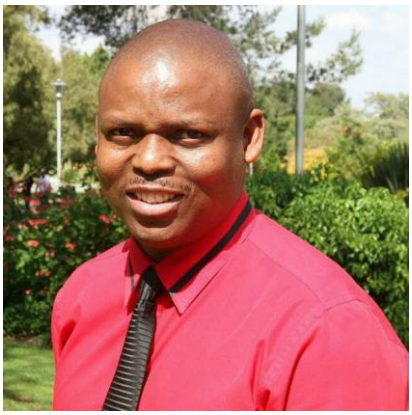
# CURRICULUM VITAE

## BIOGRAPHIC DESCRIPTION



### Professor O.M. (Martin) Ntwaeaborwa

I am a Professor of Physics at the University of the Johannesburg, where I have been employed since April 2020. I have worked for the North West University (1998-2000), University of the North (2000-2001), University of the Free State and University (2002 – 2016) and University of the Witwatersrand (2016-2020). I received my bachelor's, honours and Masters degrees of Physics from Mafikeng Campus of the North West University in 1997, 1998 and 2000 respectively; and my doctoral (PhD) degree of Physics from the University of the Free State in 2006. I have served/am serving in many capacities with South African Nanotechnology Initiative (SANi) including president in 2012-2016 and a member of board of directors since 2015-present. I was the deputy dean of the South African Young Scientists Summer Programme hosted by the University of the Free State in partnership with the International Institute of Applied Systems Analysis (IIASA) from 2012 - 2015. I was the director of the centre of excellence of UNESCO-TWAS (United Nations Educational, Scientific and Cultural Organization - The World Academy of Science) for the advancement of science in developing countries (2012-2016). I was a member of the national portfolio committee of energy of the government of South Africa (2013-2016).

I am C1 rated researcher by the South African National Research Foundation (NRF) (since 2014). I have (co-) authored more than 260 peer-reviewed articles in peer reviewed journals of science, 7 book chapters, and more than 100 conference proceedings. My published research articles have been cited more than 4375 times in the web of science/Scopus with an H-index of 32 (web of science), 32 (Scopus), and 36 (Google Scholar). I have (co-) presented more than 200 research papers at international and local conferences. I have given numerous invited talks at international science conferences including American Vacuum Society Symposia, International Conference in Nanomaterials, International conference on persistent phosphors, and from solid state physics to biophysics conference, Energy Challenges and Mechanics, and Southern African Solar Energy Conference.

I have supervised over 10 Postdoctoral, 23 doctoral, 20 Masters, 10 Honours and 10 final year undergraduate students, doing research in the field of luminescent nanomaterials (nanophosphors) applied to solar cells, displays, solid state lighting and phototherapy. I am serving as external examiner of PhD and MSc theses from different Universities in South Africa and abroad. I am also serving as a referee for numerous prestigious journals of, inter alia, Institute of Physics Publishing (IOP) and American Institute of Physics (AIP). I have been serving in numerous panels/committees of the National Department of Science and Technology (DST) and the South African National Research Foundation (NRF) since 2005. For example, in 2009 I was a member of the NRF/DST committee that was tasked to evaluate aberration-corrected high resolution electron microscope (HRTEM) for the national centre of microscopy that was established at the Nelson Mandela Metropolitan University in the following two years. I am a board member of the HRTEM at the centre of microscopy at Nelson Mandela University, and the User's Advisory Committee of the Materials Research Department of iThemba labs. I was a member of the DST's academic planning committee that developed and implemented the first MSc nanoscience programme in South Africa which was introduced concurrently at the University of Western Cape, University of the Free State, University of Johannesburg and Nelson Mandela Metropolitan University in January 2012. I have represented South Africa in bilateral discussions for Research Corporation in science and technology with countries such as South Korea, France, Taiwan and Argentine.

I was a member of the consortium that was tasked to collate radon gas data from different surveys carried out by the National Nuclear Regulator in 2000-2001. I was a member of the 3 -members panel tasked to carry out a review of the Radiation Science Department of the Research and Development Division of Necsa (the South African Nuclear Energy Corporation) in 2012. I was among the top six scientists selected to represent South Africa at an International workshop organized by the International Union of Pure and Industrial Physics (IUPAP) in Cape Town in February 2012, where I presented a paper on luminescent nanomaterials. I was a member of the committee that organized the South African Institute of Physics Conference in 2004. Since 2008, I have been serving in the committee that organizes the South African Conference in Photonic Materials (SACPM) that takes place every second year in South Africa. I was the chairman of the committee that organized the fourth international conference in Nanoscience and Nanotechnology (NanoAfrica2012) that took place in 1-4 April 2012 at the University of the Free State. I am a member of the South African Institute of Physics (SAIP), South African Photonic Initiative (SAPI), South African Nanotechnology Initiative (SANi), microscopy society South Africa (MSSA), American Chemical Society (ACS) and American Vacuum Society (AVS). In addition, I am a member of the Academy of Science South Africa (ASSAF). I was admitted into the membership of the golden key honour society in 2012. I was selected by the Department of Science and Technology to present the Nanoscience and Nanotechnology programme of South Africa and participate in the discussion for sustainable development at the workshop organized by the United Nations Addis Ababa in November 2018.

My achievements and contribution to research have featured in numerous newspapers including Mail and Guardian, Volksblaad, Ons Stad, and Bloemfontein Courant. I was interviewed live on SABC2 TV news, SA FM (live interview), Lesedi FM (Live interview) and Motheo FM (Live interview) discussing my achievements and contribution to research in Nanoscience and Nanotechnology. I have received numerous awards including Research Excellence Award from the University of the

Free State in 2004 and 2010, Young Black Research Award from the National Science and Technology Forum in 2009, and Young Investigator award from the Thin Film Division of the American Vacuum Society in 2010.

## Personal Information

**First Names:** Odireleng Martin
**Family Name:** Ntwaeaborwa
**Place of Birth:** Taung, North West Province
**Nationality:** South African
**Married Status:** Married to Molly Ntwaeaborwa
**Residential Address:** Linden, Johannesburg
**Work Address:** Department of Physics, University of Johannesburg, P.O. Box 524, Auckland Park, 2006
E-mail: martin.ntwaeaborwa@wits.ac.za OR ntwaeab@gmail.com
Tel: Office: 011 559 3036

## Professional Preparation:

| | | |
|---|---|---|
| University of North West | BSc Ed. (Physics and Chemistry) | 1997 |
| University of North West | BSc Honours (Physics) | 1998 |
| University of North West | MSc (Physics) | 2000 |
| University of the Free State | PhD (Physics) | 2006 |

## Short (Training) Courses

1. The Use of Radioactive Isotopes for Industrial Measurements organized by Measuring Company South Africa (MECOSA)-1999

A technical course covering
(a) Basic theory on nuclear radiation
(b) The legal requirements to acquire process and use radioactive isotopes

2. Basic Laser Safety Course – 2007 (Organized by National Laser Centre)
3. Leadership and Management of Higher Education Institutions – Maastricht School of Management (The Netherlands) – 16 Nov – 04 Dec 2015

## Appointments:

| | |
|---|---|
| Professor-Physics – University of Johannesburg | April 2020 - present |
| Professor – Physics – University of the Witwatersrand | 2016 – March 2020 |
| Professor -Physics – University of the Free State | 2012 - 2016 |
| Associate Professor-Physics – University of the Free State | 2010- 2011 |
| Senior Lecturer - Physics -University of the Free State | 2008-2009 |
| Lecturer-Physics -University of the Free State | 2002-2007 |
| Lecturer -Physics -University of the North-QwaQwa | 2000-2001 |
| Junior Lecturer - Physics -University of North West | 1998-1999 |

## Leadership Positions

### (1) President of the South African Nanotechnology Initiative – 2012 – 2016

**Responsibilities:**

-Day-to-day running of the organization
-Call and chair meetings
-Revise and amend the constitutin of the organization
-Develop and implement the long term strategic plan of the organization
-Procure funds for the organization
-Registration of the organization as non-profit organization
-Organized international conferences, workshops and student symposia.
-Administered and managed the finances of the organization

### (2) Director of the UNESCO-TWAS centre of excellence – 2012 – 2016

**Responsibilities:**

-Enable researchers from developing countries to visit UFS and other centres of excellence that are in the joint associateship scheme with TWAS-UNESCO
-Solicit funds for researchers from UNESCO

### (3) Deputy dean of the South African Young Summer Programme – 2012 – 2015

**Responsibilities**

-Deputized on behalf of the dean
- plan and drive the academic component of the programme
-presided at workshops and seminars
-recruited postdoctoral fellows

### (4) SUBJECT HEAD OF PHYSICS – University of the North-QwaQwa – 2000-2001

**Responsibilities**

-Revamped the entire undergraduate programme of Physics
-Developed and implemented postgraduate programme in Physics
-Initiated research
-Recruitment of staff and students
-Trained and mentored student assistants
-Prepared annual budget for the department, administered and managed finances of the department
-Procurement of resources (computers, office furniture, laboratory equipment)

## Committees,/Panels/Boards

(1) Representative of the faculty of natural science and agriculture in the Executive Committee of the Senate – University of the Free state
(2) Member of senate of the University of the Free State
(3) Member of the honorary degree committee – University of the Free State
(4) Member of the Adjudication panel of the NSTF-BHP Billiton Awards 2012/2013
(5) Board member of the national Centre for High Resolution Transmission Electron Microscopy– 2012-present
(6) Board member of Materials Research Department of Ithemba labs – 2012 - present
(7) served/serves in numerous review panels of the National Research Foundation (NRF)

(8) Member of the national portfolio committee of energy of the government of South Africa – 2012 - 2016
(9) Member of staffing and promotions committee – Faculty of engineering and built environment – University of the Witwatersrand : 2017 – present
(10) Panel Member of the NRF rating panel for Physics – 2016
(11) Panel member of the review committee of the School of Animal and Environmental Sciences (APES) – University of the Witwatersrand – 2016
(12) Panel Member – NRF rating application committee – 2017 – 2021
(13) Chairperson of the Transformation Forum of the School of Physics –Wits University

## Postgraduate Students Supervision (See appendix A)

Postdoctoral = 9 completed, 1 Ongoing
Doctoral = 21 Completed, 5 Ongoing
Masters = 20 Completed, 2 Ongoing

## Publications (See appendices B and C)

Peer reviewed articles in journals: more than 252,
Peer reviewed Conference proceedings: more than 100
Book chapters: 7

## Presentations : (See Appendix D)

International – more than 130
Local – more than 100

## Awards:

(1) Research excellence award -University of the free State-2004, 2010
(2) Best PhD Presentation Award– South African Institute of Physics Conference– 2006
(3) South African National Science and Technology Forum Award (Young Researcher) – 2009
(4) American Vacuum Society (Young Investigator Award) – 2010
(5) Honorary Research Award – University of the Free State - 2010
(6) An award for the best presentation: 3rd Southern African Solar Energy Conference – 2015

## Research funds Solicited for UFS/WITS( See Appendix E)

**OVER R40 million for research, research infrastructure and student bursaries – between 2004 and 2019.**

**REFEREES**

1. Prof Bruce Mellado
   Professor: School of Physics – Wits University
   Email: bruce.mellado@wits.ac.za or Bruce.Mellado.Garcia@cern.ch

2. Prof. N.J. Heideman
   Faculty of Natural Science and Agriculture (former dean) – University of the Free State
   Te: 051 401 2322
   e-mail: heidemannj@ufs.ac.za

3. Dr Sohye Cho
   Korea Insitute of Science and Technology
   Email: sohyec@kist.re.kr

4. Prof. Paul H. Holloway
   Department of Materials Science and Engineering-University of Florida
   Tel: 352-846-3330 (w)
   Fax: 352-392-4911
   e-mail: pholl@mse.ufl.edu

5. Prof. Malik Maaza
   Ithemba Labs-University of South Africa
   e-mail: maaza@tlabs.ac.za

6. Dr. J-K. Park
   Korea Institute of Science and Technology
   e-mail: jkpark@kist.re.kr, or jkpark@nanotech2020.org

# APPENDIX A
# POSTGRADUATE STUDENTS SUPERVISION

## DOCTORAL

| Name | Gender | Nationality | Year Completed | My Role |
|---|---|---|---|---|
| 1. B.M. Mothudi | Male | South African | 2010 | co-supervisor |
| 2. P.D. Nsimama | Male | Tanzanian | 2011 | co-supervisor |
| 3. J.J. Dolo | Male | South African | 2012 | co-supervisor |
| 4. G.H. Mhlongo | Female | South African | 2012 | supervisor |
| 5. H.A.A. Seed Ahmed | Male | Sudanese | 2012 | co-supervisor |
| 6. P.S. Mbule | Female | South African | 2013 | supervisor |
| 7. S.K.K. Shaat | Male | Palestinian | 2013 | supervisor |
| 8. M.-M. Duvenhage | Female | South African | 2014 | co-supervisor |
| 9. Y.A. Mohmmed | Male | Sudanese | 2014 | co-supervisor |
| 10. L.L. Noto | Male | South African | 2015 | co-supervisor |
| 11. K.G. Tshabalala | Male | South African | 2015 | supervisor |
| 12. S.V. Motloung | Male | South African | 2015 | co-supervisor |
| 13. M.A. Tshabalala | Female | South African | 2015 | supervisor |
| 14. R.L. Nyenge | Male | Kenyan | 2015 | supervisor |
| 15. S.J. Motloung | Male | South African | 2018 | supervisor |
| 16. P.P. Mokoena | Female | South African | 2017 | supervisor |
| 17. M.A. Lephota | Female | South African | 2018 | supervisor |
| 18. S.N. Ogugua | Male | Nigeria | 2018 | supervisor |
| 19. SJ Mofokeng | Male | South African | 2020 | supervisor |
| 20. Fekadu Ayele | Male | Ethiopia | Ongoing | supervisor |
| 21. Frank Komati | Male | South Africa | 2020 | supervisor |
| 22. E. Hasabedaim | Male | Sudanese | 2020 | co-supervisor |
| 23. Tresor Matindi | Male | Rwanda | 2019 | Co-supervisor |
| 24. Thabang Melato | Male | South Africa | Ongoing | supervisor |
| 25. Nyepuzai Gatsi | Female | Zimbabwe | Ongoing | supervisor |
| 26. Prettier Maleka | Female | South Africa | Ongoing | supervisor |
| 27. Abraham Leanyatsa | Male | South African | Ongoing | Supervisor |

## MASTERS

| Name | Gender | Nationality | Year completed | My Role |
|---|---|---|---|---|
| 1. P.S. Mbule | Female | South African | 2010 | supervisor |
| 2. M-M Duvenhage | Female | South African | 2010 | co-supervisor |
| 3. M.A. Lephota | Female | South African | 2012 | supervisor |
| 4. P.A. Moleme | Female | South African | 2012 | supervisor |
| 5. T.S.T Dlamini | Male | South African | 2014 | co-supervisor |
| 6. P.P. Mokoena | Female | South African | 2014 | supervisor |
| 7. S.N. Ogugua | Male | Nigerian | 2015 | supervisor |
| 8. T. Mokoena | Male | South African | 2016 | supervisor |
| 9. S. Mofokeng | Male | South African | 2016 | supervisor |
| 10. Z.P. Tshabalala | Female | South African | 2016 | supervisor |
| 11. K. Shingange | Female | South African | 2016 | supervisor |
| 12. B. Mabuea | Female | South African | 2017 | supervisor |
| 13. Pulane Mokoena | Female | South African | 2017 | supervisor |
| 14. Mpho Mokoena | Male | South African | 2017 | co-supervisor |
| 15. P. Raleooa | Male | South African | 2017 | supervisor |
| 16. E. Hasabedaim | Male | Sudanese | 2017 | co-supervisor |
| 17. J. Kraai | Female | South African | ongoing | supervisor |
| 18. P.M. Maleka | Female | South Africa | 2018 | supervisor |
| 19. T. Nkosi | Male | South Africa | 2018 | supervisor |
| 20. M.L.A. Letswalo | Male | South Africa | 2018 | supervisor |

## POSTDOCTORAL

| Name | Gender | Nationality | Year | My Role |
|---|---|---|---|---|
| 1. J.M. Ngaruiya | Male | Kenyan | 2007-2008 | co-supervisor |
| 2. Vinay Kumar | Male | Indian | 2008-2009 | co-supervisor |
| 3. Shreyas Pitale | Male | Indian | 2008-2010 | co-supervisor |
| 4. Indrajit Nagpure | Male | Indian | 2008 - 2011 | co-supervisor |
| 5. S.K.K. Shaat | Male | Palestinian | 2013 - 2014 | supervisor |
| 6. Y.A. Mohmmed | Male | Sudanese | 2014 - present | co-supervisor |
| 7. Vinod Kumar | Male | Indian | 2012-present | co-supervisor |
| 8. Balakrishina Avula | Male | Indian | 2015 - ongoing | supervisor |
| 9. E. Linganiso | Female | South African | 2016 - 2016 | supervisor |
| 10. David Kumi | Male | Ghana | 2017 - ongoing | supervisor |

# APPENDIX B
# List OF PUBLICATION – JOURNALS/BOOK CHAPTERS

| Publication Details | Year | Status |
|---|---|---|
| 1. **OM Ntwaeaborwa**, ND Kgwadi, SH Taole, R Strydom, Measurement of the Equilibrium Factor between Radon and its Progeny in the Underground Mining Environment, *Health Physics* **84** (4) (2004) 374 -377 | **2004** | **Published** |
| 2. **OM Ntwaeaborwa,** KT Hillie, HC swart, Degradation of $Y_2O_3$:Eu powders, *Phys. Stat. Sol.* **C 1** (9) (2004) 2366-2371 | **2004** | **Published** |
| 3. KT Hillie, **OM Ntwaeaborwa,** HC Swart, Degradation of pulsed laser deposited $Y_2O_3$:Eu thin film phosphors, *Phys. Stat. Sol.* **C 1 (9)** (2004) 2360 – 2365 | **2004** | **Published** |
| 4. **OM Ntwaeaborwa,** PH Holloway, Enhanced photoluminescence of $Ce^{3+}$ induced by an energy transfer from ZnO nanoparticles encapsulated in $SiO_2$, *Nanotechnology* **16** (6)(2005) 865 – 868 | **2005** | **Published** |
| 5. **OM Ntwaeaborwa**, HC Swart, RE Kroon, PH Holloway, JR Botha, Photoluminescence of cerium-europium doubly activated $SiO_2$ phosphors prepared by sol-gel method, *Surf. Interface. Anal.* **38**(4) (2006) 458-461 | **2006** | **Published** |
| 6. **OM Ntwaeaborwa,** Swart H.C., Kroon R.E., Holloway P.H. and Botha J.R, Enhanced luminescence and degradation of $SiO_2$:Ce,Tb powder phosphors prepared by a sol-gel process, *J. Phys. Chem. Sol.* 67 (8) (2006) 1749-1753 | **2006** | **Published** |
| 7. E Coetsee, HC Swart, JJ Terblans, **OM Ntwaeaborwa**, KT Hillie, WA Jordaan and U Butner, Characterization of $Y_2SiO_5$:Ce thin films, *Optical Materials*, **29**(11)(2007) 1338-1343 | **2007** | **Published** |
| 8. MS Dhlamini, JJ Terblans, **OM Ntwaeaborwa** and HC Swart, Synthesis and degradation of the PbS nanoparticle phosphors embedded in $SiO_2$, ($SiO_2$:PbS), *Surface Review and Letters*, **14** (4) (2007) 697-701 | **2007** | **Published** |
| 9. HC Swart, JJ Terblans, E Coetsee, **OM Ntwaeaborwa**, MS Dhlamini and PH Holloway, A Short review on the ESSCR mechanism for phosphor degradation, *J. Vac. Sci Technol. A* 25 (4) (2007) 917-921 | **2007** | **Published** |
| 10. **OM Ntwaeaborwa**, HC Swart, RE Kroon and PH Holloway, Cathodoluminescence Degradation of $SiO_2$:Ce,Tb powder phosphor prepared by a sol-gel process, *J. Vac. Sci Technol. A* 25 (4) (2007) 1152-1155. | **2007** | **Published** |
| 11. JM Ngaruiya, S Niewoudt, JJ Terblans, **OM Ntwaeaborwa**, HC Swart, Resolution of $Eu^{2+}$ assymetrical emission peaks of $SrAl_2O_4$:$Eu^{2+}$,$Dy^{3+}$ phosphor by cathodoluminescence | **2008** | **Published** |

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| measurements, *Materials Letter*s, 62 (2008) 3192-3194 | | |
| 12. **OM Ntwaeaborwa**, M.S. Dhlamini, J.R. Botha and H.C. Swart, Charaterization of sol-gel $SiO_2$:Ce,Tb powder and pulsed laser deposited thin film phosphor, *Phys. Stat. Sol. C***,** 5(2) (2008), 602 – 605. | **2008** | **Published** |
| 13. MS Dhlamini, JJ Terblans, **OM Ntwaeaborwa**, HD Joubert and H.C. Swart, Preparations and luminescent properties of PbS nanoparticle phosphors incorporated in a $SiO_2$ matrix – *Phys. Stat. Sol. C***,** 5(2) (2008), 598-601 | **2008** | **Published** |
| 14. JJ Dolo, JJ Terblans, BF Dejene, E Coetsee, **OM Ntwaeaborwa** and HC Swart, Degradation of commercial $Gd_2O_2S$:Tb phosphor, *Phys. Stat. Sol. C*, 5(2) (2008) 595-597. | **2008** | **Published** |
| 15. MS Dhlamini, JJ Terblans, **OM Ntwaeaborwa**, K.T. Hillie, JR Botha, HC Swart, Photoluminescence properties of powder and pulsed laser deposited PbS nanoparticles in $SiO_2$, *J. Lumin*. 128(12)(2008), 1997-2003 | **2008** | **Published** |
| 16. MS Dhlamini, JJ Terblans, RE Kroon, **OM Ntwaeaborwa,** JM Ngaruiya, JR Botha, HC Swart, Photoluminescence Properties of $SiO_2$ Surface-Passivated PbS Nanoparticles, *South African Journal of Science*, 104 (2008) 398-400 | **2008** | **Published** |
| 17. **OM Ntwaeaborwa,** HC Swart, RE Kroon, JJ Terblans, PH Holloway, Synthesis, Characterization and Luminescent Properties of ZnO-$SiO_2$:PbS, *J. Vac. Sci Technol. A* 27 (4) (2009) 767-769 | **2009** | **Published** |
| 18. H.C. Swart, J.J. Terblans, **O.M. Ntwaeaborwa**, E Coetsee, B.M. Mothudi and M.S. Dhlamini, Photon emission mechanisms of different phosphors, *Nucl. Instr. and Meth. B* 267 (2009) 2630-2633 | **2009** | **Published** |
| 19. V. Kumar, HC Swart, **OM Ntwaeaborwa,** R Kumar, SP Lochab, V Mishra, N Singh, Thermoluminescence response of CaS:$Bi^{3+}$ nanophosphor exposed to 200 MeV $Ag^{+15}$ ion beam, *Optical Materials*,32 (2009) 164-168 | **2009** | **Published** |
| 20. **OM Ntwaeaborwa**, RE Kroon, V. Kumar, T Dubroca, J-P Ahn, J-K Park, HC Swart, Ex- situ synthesis and optical properties of ZnO-PbS nanocomposite, *J. Phys. Chem. Sol*. 70 (2009) 1438-1442 | **2009** | **Published** |
| 21. **O.M. Ntwaeaborwa**, P.D.Nsimama, J.T. Abiade, E. Coetsee and H.C Swart, The effects of substrate temperature on the structure, morphology and photoluminescence properties of pulsed laser deposited SrAl2O4:$Eu^{2+}$,$Dy^{3+}$ thin films, *Physica B: Condensed Matter*. 404 (2009) 4436-4439 | **2009** | **Published** |
| 22. M.M. Biggs, **O.M. Ntwaeaborwa**, J.J. Terblans, and H.C. Swart, Characterization and luminescent properties of $SiO_2$:ZnS:$Mn^{2+}$ and ZnS:$Mn^{2+}$ nanophosphors synthesized by | **2009** | **Published** |

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| a sol-gel method, *Physica B:Condensed Matter* 404 (2009) 4470-4475 | | |
| 23. B.M Mothudi, **O.M. Ntwaeaborwa**, J.R. Botha and H.C. Swart, Photoluminescence and phosphorescence properties of $MAl_2O4:Eu^{2+},Dy^{3+}$ (M = Ca, Ba, Sr) phosphors prepared at an initiating combustion temperature of 500 $^oC$, *Physica B:Condensed Matter*. 404 (2009) 4440-4444 | **2009** | **Published** |
| 24. P.D. Nsimama, **O.M. Ntwaeaborwa**, E. Coetsee and H.C Swart, The influence of the number of pulses on the morphological and photoluminescence properties of $SrAl2O4:Eu^{2+}$, $Dy^{3+}$ thin films prepared by pulsed laser deposition, Physica B:Condensed Matter 404 (2009) 4489-4492. | **2009** | **Published** |
| 25. M.S. Dhlamini, **O.M. Ntwaeaborwa**, J.M. Ngaruiya, H.C. Swart, KT Hillie, Sensitized luminescence through nanoscopic effects of ZnO encapsulated in $SiO_2:Tb^{3+}$ sol-gel derived phosphor, Physica B: Condensed Matter. 404 (2009) 4406-4410. | **2009** | **Published** |
| 26. E Coetsee, JJ Terblans, **OM Ntwaeaborwa**,HC Swart, Luminescent Mechanism of $Y_2SiO_5:Ce^{3+}$, Physica B:Condensed matter 404 (2009) 4426-4430. | **2009** | **Published** |
| 27. Amrita Saxena, D.N.S. Srivastwa, Suruchi Sharma, Seema Thakur, Vinay Kumar, **O.M. Ntwaeaborwa** and H C Swart, Perculiar features of KCL+$SbCl_3$ Phosphors: PL and XRD studies, Journal of Modern Optics, **56** (17) (2009) 1880-1884. | **2009** | **Published** |
| 28. Vinay Kumar, Varun Mishra, MM Biggs,IM Nagpure,**OM Ntwaeaborwa**, JJ Terblans, HC Swart, Electron beam induced green luminescence and degradation study of CaS:Ce nanocrystalline phosphors for FED applications, *Applied Surface Science*, 256 (2010) 1720 -1724 | **2010** | **Published** |
| 29. I.M. Nagpure, K.N. Shinde, Vinay Kumar, **OM Ntwaeaborwa,** SJ Dohble, HC Swart, Combustion synthesis and luminescence properties of $Na_3Al_2(PO)_4$:RE (Ce,Eu,$Mn^{2+}$) phosphors, Journal of Alloy and Compounds, 492 (2010) 384-388 | **2010** | **Published** |
| 30. Vinay Kumar, Varun Mishra, MM Biggs, **OM Ntwaeaborwa**, HC Swart, Optical and luminescence investigations of $Ce^{3+}$ doped CaS long after glow Nanophosphors, J. Alloys Compd. 492 (2010) L8-L12 | **2010** | **Published** |
| 31. Vinay Kumar, Shreyas S Pitale, MM Biggs, IM Nagpure, **OM Ntwaeaborwa**, HC Swart, Synthesis of $Ce^{3+}$ doped SrS nanocrystalline phosphors using a simple aqueous method, Mat. Lett. (2010) 752-754 | **2010** | **Published** |
| 32. **OM Ntwaeaborwa,** PD Nsimama, Vinay Kumar, IM | **2010** | **Published** |

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|---|---|---|
| Nagpure, Shreyas Pitale, E. Coetsee, JJ Terblans, HC Swart, Photoluminescence properties of $SrAl_2O_4:Eu^{2+},Dy^{3+}$ thin phosphor films grown by pulsed laser deposition, J. Vac. Sci. Tech A. 28 (4) (2010) 901-905 | | |
| 33. HC Swart, JJ Terblans, E Coetsee, V Kumar, **OM Ntwaeaborwa**, MS Dhlamini, JJ Dolo, Auger electron spectroscopy and X-ray photoelectron spectroscopy study on electron-stimulated surface chemical reaction mechanism of phosphor degradation, Surface Interface Analysis, 42 (2010) 922-926 | **2010** | **Published** |
| 34. H.C. Swart, E Coetzee, J.J. Terblans, **O.M. Ntwaeaborwa**, P.D. Nsimama and J.J. Dolo, Cathodoluminescence degradation of PLD thin films, Applied Physics A (2010) 633-638 | **2010** | **Published** |
| 35. J.J. Dolo, H.C. Swart, J.J. Terblans, E. Coetsee, **O.M. Ntwaeaborwa** and B.F. Dejene. Effect of oxygen pressure on the structural properties of pulsed laser deposited $Gd_2O_2S:Tb$ thin films. Applied Physics A(2010) 655-659 | **2010** | **Published** |
| 36. GH Mhlongo, **OM Ntwaeaborwa**, MS Dhlamini, HC Swart, TK Hillie, Cathodoluminescence properties of $SiO_2:Pr^{3+}$ and $ZnO\text{-}SiO_2:Pr^{3+}$ phosphor nanopowders, Materials Science, 45 (2010) 5228-5236 | **2010** | **Published** |
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# BOOK CHAPTERS

| PUBLICATION DETAILS | YEAR | STATUS |
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| 7. Vinod Kumar**,** SP Tiwari, O.M. Ntwaeaborwa, H.C. Swart, Luminescence properties of rare-earths doped oxide materials, Chapter 10 in Spectroscopy of lanthanides, Editors: SJ Dhoble, Vijay B. Pawade and Hendrik C. Swart, https://doi.org/10.1016/B978-0-08-102935-0.00010-1 (2019) pp 345-425, Wood Publishing, ISBN: 978-0-08-102935-0. | **2019** | Published |

## APPENDIX C

## PEER-REVIEWED CONFERENCE PROCEEDINGS

| PUBLICATION DETAILS | YEAR | STATUS |
|---|---|---|
| **1. OM Ntwaeaborwa**, ND Kgwadi, SH Taole, R Strydom. Underground measurement of concentration of radon and that of its progeny. *Proceedings of First Botswana International Conference on Mining*, Gaborone, Botswana, 19 – 21 November (2002) 351-355 | **2002** | **Published** |
| **2. OM Ntwaeaborwa,** MS Dhlamini, JJ Terblans, BM Mothudi, PD Nsimama, HC Swart, Phonon-mediated energy transfer from ZnO nanoparticles to $SiO_2$:PbS, Proceedings of the 14th International Workshop on Organic and Inorganic Electroluminescence & 2008 International Conference on the | **2008** | **Published** |

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| | Science and Technology of Emissive Displays and Lighting, 9-12 September 2008, Italy (Rome) pp 177 – 179 (ISBN 88-8286-194-5) | | |
| **3.** | HC Swart, BM Mothudi, S Nieuwoudt, JJ Terblans, E Coetsee, **OM Ntwaeaborwa,** Luminescent properties and degradation of $SrAl_2O_4:Eu^{2+}$, $Dy^{3+}$, 14th International Workshop on Organic and Inorganic Electroluminescence & 2008 International Conference on the Science and Technology of Emissive Displays and Lighting, 9-12 September 2008, Italy (Rome) pp 367-370 (ISBN 88-8286-194-5) | **2008** | **Published** |
| **4.** | Vinay Kumar, Shreyas S. Pitale, I.M. Nagpure, **O.M. Ntwaeaborwa** and H.C. Swart. Luminescence and electron beam induced degradation of alkaline earth sulfide based nanophosphors. *Proceedings of International Conference on Nanomaterials: Synthesis, Characterization and Applications*, April 2010, Kottayam, Kerala, India | **2010** | **Published** |
| **5.** | P.A. Moleme, JJ Dolo, HC Swart, O.M. Ntwaeaborwa, Optical properties of $SrGa_2S_4:Ce^{3+}$ thin films prepared by pulsed reactive cross laser ablation (PRCLA) technique, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 197-200 | **2011** | **Published** |
| **6.** | P.S. Mbule, G.H. Mhlongo, H.C. Swart and O.M. Ntwaeaborwa, Low Temperature Synthesis of ZnO nanoparticles and Nanorods via Wet Chemistry Route, Proceedings of the South African Institute of Physics 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 173-178 | **2011** | **Published** |
| **7.** | S.K K. Shaat, F. Roelofse, H.C. Swart and O.M. Ntwaeaborwa, Synthesis and photoluminescence properties of $Tb^{3+}$-doped $Sr_{0.5}$ $Zn_{0.5}$ $Al_2O_4$ phosphor prepared via combustion process, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 283-289 | | **Published** |
| **8.** | K.G. Tshabalala, S-H. Cho, J-K. Park, I.M. Nagpure, J.H. Neethling, J.R. Botha, H.C. Swart and O.M. Ntwaeaborwa, Enhanced green emission from UV down-converting $Ce^{3+}$ and $Tb^{3+}$ co-activated $ZnAl_2O_4$ phosphor, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 342-346 | **2011** | **Published** |
| 9. | M M Duvenhage, O M Ntwaeaborwa and H C Swart, Blended thin films of tris-(8-hydroxyquinoline) aluminium ($Alq_3$) embedded in polymethyl methacrylate (PMMA), Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 342-346, pp 84-88 | **2011** | **Published** |
| **10.** | J.J. Dolo, F.B. Dejene, J.J Terblans, O.M. Ntwaeaborwa and H.C. Swart, X-ray Photoelectron Spectroscopy analysis and | **2011** | **Published** |

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| characterization of $Gd_2O_2S:Tb^{3+}$ phosphor powder, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 78-82 | | |
| 11. G H Mhlongo, M S Dhlamini, O M Ntwaeaborwa, H C Swart, R E Kroon, P Solarz, W Ryba-Romanowski, K T Hillie, Effects of ZnO and $Ce^{3+}$ incorporation on the photoluminescence and cathodoluminescence intensity of $Pr^{3+}$ doped $SiO_2$, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 178-184 | **2011** | **Published** |
| **12.** G H Mhlongo, M S Dhlamini, O M Ntwaeaborwa, H C Swart, P Solarz, W Ryba-Romanowski, K T Hillie, The influence of $Pr^{3+}$ co-doping on the photoluminescence and cathodoluminescence properties of $SiO_2:Eu^{3+}/Tb^{3+}$, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 185-191 | **2011** | **Published** |
| 13. HAA Seed Ahmed, WD Roos, OM Ntwaeaborwa, HC Swart, RE Kroon, Effects of annealing on the $Ce^{3+}/Ce^{4+}$ration measured by XPS in luminescent $SiO_2$:Ce, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 279-183 | **2011** | **Published** |
| 14. I.M. Nagpure, Shreyas Pitale, E Coetsee, O.M. Ntwaeaborwa, J.J. Terblans, HC Swart, Low voltage electron beam induced degradation and surface chemical changes of $Zn_3(PO_4)_2$:Tb phosphor, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 231-236 | **2011** | **Published** |
| 15. L.L. Noto, S.S. Pitale, M.M. Gusowski, J.J. Terblans, O.M. Ntwaeaborwa, HC Swart, Enhancement of $Pr^{3+}$ red emission, by adding $ln^{3+}$ as co-dopant in $CaTiO_3:Pr^{3+}$ phosphor, Proceedings of the South African Institute of Physics, 12-15 July 2011, ISBN: 978-1-86888-688-3, pp 253-256 | **2011** | **Published** |
| 16. A.K. Bedyal, Vinay Kumar, S.P. Lochap, Fouran Singh,O.M. Ntwaeaborwa, H.C. Swart, Thermoluminescence response of gamma irradiated $SrAl_2O_4:Eu^{2+},Dy^{3+}$ nanophosphor, Proceedings of the International Conference on Ceramics, International Journal of Modern Physics:Conference Series, vol. 22 (2013) 365-373 | **2013** | **Published** |
| 17. Mohit Manhas, Vinay Kumar, O.M. Ntwaeaborwa, HC Swart, Synthesis and Photoluminescence of $Dy^{3+}$ doped $Sr_3B_2O_6$ nanophosphor, AIP conference proceedings, 1591, 558 (2014), doi: 10.1063/1.4872673 | **2014** | **Published** |
| 18. Mohit Manhas, Vinay Kumar, O.M. Ntwaeaborwa, HC Swart, Synthesis and Photoluminescence of $Ca_3B_2O_6$: $Tb^{3+}$ nanophosphor, AIP conference proceedings, 1591, 502 | **2014** | **Published** |

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| (2014), doi: 10.1063/1.4872673 | | |
| 19. M M Duvenhage, O M Ntwaeaborwa, E Wrzesniewski, J Xue and H C Swart, The effect of nano sized Alq3 on the external quantum and power conversion efficiencies of OLEDs, Proceedings of the South African Institute of Physics, Pretoria, 3-9 July 2012, ISBN: 978-1-77592-070-0, pp 52-56 | **2014** | **Published** |
| 20. P.P. Mokoena, I.M.Nagpure, H.C. Swart and O.M Ntwaeaborwa Synthesis and characterization of a narrowband $Ca_5$ $(PO_4)_3(OH):Gd^{3+}$, $Pr^{3+}$ phosphor for medical applications, Proceedings of the South African Institute of Physics, Pretoria, 3-9 July 2012, ISBN: 978-1-77592-070-0, pp 132-137 | **2014** | **Published** |
| 21. LL Noto, SS Pitale, OM Ntwaeaborwa and HC Swart, Luminescence dynamics of $GdTaO_4$: $Pr^{3+}$, Proceedings of the South African Institute of Physics, Pretoria, 3-9 July 2012, ISBN: 978-1-77592-070-0, pp 164-169 | **2014** | **Published** |
| 22. K.G. Tshabalala, H.C. Swart, O.M. Ntwaeaborwa, Energy transfer from $Ce^{3+}$ to $Tb^{3+}$ in low quartz and amorphous $SiO_2$, 3-9 July 2012, ISBN: 978-1-77592-070-0, pp 233-239 | **2014** | **Published** |
| 23. Shaat S.K.K., Swart H.C., O.M. Ntwaeaborwa, A new white light phosphor, Proceedings of the South African Institute of Physics, Pretoria, 3-9 July 2012, ISBN: 978-1-77592-070-0, pp 203 - 208 | **2014** | **Published** |
| 24. A. Yousif, H.C. Swart, O.M. Ntwaeaborwa, E. Coetsee, The influence of working atmosphere on $Y_3(Al,Ga)_5O_{12}:Tb^{3+}$, Proceedings of the South African Institute of Physics, Pretoria, 3-9 July 2012, ISBN: 978-1-77592-070-0, pp 252-257 | **2014** | **Published** |
| 25. STS Dlamini, H.C. Swart, O.M. Ntwaeaborwa, Morphological and luminescent properties of $Y_3(Al,Ga)_5O_{12}:Ce^{3+}$, Proceedings of the South African Institute of Physics, Pretoria, 3-9 July 2012, ISBN: 978-1-77592-070-0, pp 482 - 487 | **2014** | **Published** |
| 26. M.A. Tshabalala, B.F. Dejene, H.C. Swart, O.M. Ntwaeaborwa, Effects of annealing temperature on the optical properties of ZnO, Proceedings of the South African Institute of Physics, Pretoria, 3-9 July 2012, ISBN: 978-1-77592-070-0, pp 240 - 244 | **2014** | **Published** |
| 27. M M Duvenhage, O M Ntwaeaborwa, HG Visser, PJ Swarts, JC Swarts, and H C Swart, The effect of EWG and EDG on the HOMO and LUMO of $Alq_3$, Proceedings of the South African Institute of Physics, Richardsbay, 8-12 July 2013, *ISBN: 978-0-620-62819-8*, pp 19-24 | **2014** | **Published** |
| 28. P.P. Mokoena, I.M. Nagpure, Vinay Kumar, H.C. Swart and O.M Ntwaeaborwa, Luminescent roperties of | **2014** | **Published** |

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| $Ca_5(PO_4)_3OH:Gd^{3+}$, $Pr^{3+}$ phosphor powder, Proceedings of the South African Institute of Physics, Richardsbay, 8-12 July 2013, *ISBN: 978-0-620-62819-8*, pp 104 - 109 | | |
| 29. Noto LL, Pitale SS, Ntwaeaborwa OM, Terblans JJ, Yagoub MYA and Swart HC, Effects of different TiO2 phases on the luminescence of CaTiO3:$Pr^{3+}$, Proceedings of the South African Institute of Physics, Richardsbay, 8-12 July 2013, *ISBN: 978-0-620-62819-8*, pp 121 - 127 | **2014** | **Published** |
| 30. P.S. Mbule, H.C. Swart and O.M. Ntwaeaborwa, Efficiency degradation of organic solar cells with solution processed ZnO nanoparticles, Proceedings of the South African Institute of Physics, Richardsbay, 8-12 July 2013, *ISBN: 978-0-620-62819-8*, pp 91-97 | **2014** | **Published** |
| 31. M A Tshabalala, H C Swart, O M Ntwaeaborwa, Photoluminescent properties of Sr2SiO4:$Tb^{3+}$,$Eu^{3+}$ phosphor, Proceedings of the South African Institute of Physics, Richardsbay, 8-12 July 2013, *ISBN: 978-0-620-62819-8*, pp 181 - 186 | **2014** | **Published** |
| 32. A. Yousif , H.C. Swart, O.M. Ntwaeaborwa, Effect of annealing on the structure of $Y_3(Al,Ga)_5O_{12}$:Tb thin films grown by PLD, Proceedings of the South African Institute of Physics, Richardsbay, 8-12 July 2013, *ISBN: 978-0-620-62819-8*, pp 211 - 216 | **2014** | **Published** |
| 33. S.K.K. Shaat, H.C. Swart, O.M. Swart, White cathodoluminescence from $Zn_{0.3}Mg_{0.7}Al_2O_4:Tb^{3+}$, $Eu^{3+}$, Proceedings of the South African Institute of Physics, Richardsbay, 8-12 July 2013, *ISBN: 978-0-620-62819-8*, pp 140 - 145 | **2014** | **Published** |
| 34. Vinod Kumar, H. C. Swart and O. M. Ntwaeaborwa, Synthesis of zinc oxide based nanophosphors by solution combustion method, Proceedings of the South African Institute of Physics, Richardsbay, 8-12 July 2012, *ISBN: 978-0-620-62819-8*, pp 61-66 | **2014** | **Published** |
| 35. Mbule P.S., H.C. Swart, O.M. Ntwaeaborwa, M.S. Dhlamini and B.M. Mothudi, PH3T:PCBM based solar cells: A short review focusing on ZnO nanoparticles buffer layer, post fabrication annealing and an inverted symmetry, Proceedings of the 3rd Southern African Solar Energy Conference, 11 – 13 May 2015, Kruger National Park, South Africa, (2015) 501 - 506 | **2015** | **Published** |
| 36. Vinod Kumar, H.C. Swart, Vijay Kumar, Anurag Pandey, L.P. Purohit and O.M. Ntwaeaborwa, Effects of doping on ZnO based transparent conducting oxide and down conversion phosphors for solar cell applications, Proceedings | **2015** | **Published** |

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| of the 3rd Southern African Solar Energy Conference, 11 – 13 May 2015, Kruger National Park, South Africa, (2015) 476 - 480 | | |
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## PRESENTATIONS: APPENDIX D

**International Conferences**

1. **OM Ntwaeaborwa**, ND Kgwadi, SH Taole, R Strydom, Measurement of the Equilibrium Factor between Radon and its Progeny in the Underground Mining Environment, Detecting environmental change conference, University of London, London, July 2001

2. **OM Ntwaeaborwa**, ND Kgwadi, SH Taole, R Strydom, Underground measurement of concentration of radon and that of its progeny. First Botswana International Conference on Mining, University of Botswana, Gabarone, November 2002.

3. **OM Ntwaeaborwa**, KT Hillie and HC Swart, Degradation of $Y_2O_3$:Eu phosphor powders. Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, February 2004.

4. KT Hillie, **OM Ntwaeaborwa** and HC Swart, Electron beam induced degradation of pulse laser deposited $Y_2O_3$:Eu thin film phosphor with a $Ta_2O_5$ surface coating. Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, February 2004.

5. **OM Ntwaeaborwa**, PH Holloway, RE Kroon and HC Swart, Photoluminescence of $Ce^{3+}$-$Eu^{3+}$ doubly activated $SiO_2$ nanocrystal phosphors prepared by the sol gel method. Ecasia05, 11th European Conference on Applications of Surface and Interface Analysis. Vienna University of Technology, Vienna, September 2005.

6. HC Swart, JJ Terblans, E Coetsee, **OM Ntwaeaborwa**, MS Dhlamini and PH Holloway, A Short review on the ESSCR mechanism for phosphor degradation, AVS 53rd International Symposium, San Francisco, November 2006.

7. **OM Ntwaeaborwa**, HC Swart, RE Kroon and PH Holloway, Cathodoluminescence Degradation of $SiO_2$:Ce,Tb powder phosphor prepared by a sol-gel process, AVS 53rd International Symposium, San Francisco, November 2006.

8. MS Dhlamini, JJ Terblans, **OM Ntwaeaborwa** and HC Swart, Synthesis and degradation of the PbS nanoparticle phosphors embedded in $SiO_2$, ($SiO_2$:PbS), Asian Pacific Conference on Surface Science and Engineering, Hong Kong, December 2006.

9. E. Coetsee, J.J. Terblans, **O.M. Ntwaeaborwa**, K.T. Hillie, W.A. Jordaan and U. Buttner, H.C. Swart, Characterization (EDS, SEM AND AFM) of $Y_2SiO_5$:Ce thin films grown with PLD The 45$^{th}$ Annual Conference of the Microscopy Society of Southern Africa, Port Elizabeth, South Africa, December 2006.

10. **OM Ntwaeaborwa**, M.S. Dhlamini, J.R. Botha and H.C. Swart, Characterization of sol-gel $SiO_2$:Ce,Tb powder and pulsed laser deposited thin film phosphor, Conference on Photonic Materials, Kariega, South Africa, May 2007

11. M.S. Dhlamini, J.J. Terblans, **O.M. Ntwaeaborwa**, HD Joubert and H.C. Swart, Preparations and luminescent properties of PbS nanoparticle phosphors incorporated in a $SiO_2$ matrix, Conference on Photonic Materials, Kariega, South Africa, May 2007.

12. JJ Dolo, JJ Terblans, BF Dejene, E Coetsee, **OM Ntwaeaborwa** and HC Swart, Degradation of commercial $Gd_2O_2S$:Tb phosphor, Conference on Photonic Materials, Kariega, South Africa, May 2007.

13. **OM Ntwaeaborwa**, JM Ngaruiya, E Coetsee, HC Swart, Enhanced luminescence of $SiO_2$:$Tb^{3+}$ induced by an energy transfer from encapsulated ZnO nanoparticles, Intenrational Centre for Materials Research (ICMR) workshop, Richardsbay, South Africa, July 2007.

14. JM Ngaruiya, **OM Ntwaeaborwa**, E Coetsee, HC Swart, Enhanced Luminescence of $SiO_2$:$Tb^{3+}$ induced by an Energy transfer from Encapsulated ZnO nanoparticles. AMRS 4th International Conference, 10-14th December 2007, Dar Es Salam (Tanzania).

15. GH Mhlongo, **OM Ntwaeaborwa,** MS Mohlala, KT Hillie, Photoluminescence Properties of Sol-gel Derived Nanosized $Y_2O_3$:$Eu^{3+}$ phosphors, 5th International Conference on Semiconductor Quantum Dots, 11-16 May 2008, Gyeongju (South Korea)

16. MS Dhlamini**, OM Ntwaeaborwa,** JM Ngaruiya, JJ Terblans, HC Swart, Sol-gel synthesis and luminescence properties of $ZrO_2$:PbS powder phosphor, 14th International Conference on solids films and surfaces, Dublin, Ireland, June 2008

17. **OM Ntwaeaborwa,** MS Dhlamini, JJ Terblans, BM Mothudi, PD Nsimama, HC Swart, Phonon mediated energy transfer from ZnO nanoparticles to $SiO_2$:PbS, 14th International Workshop on organic and Inorganic Electroluminescence & 2008 International Conference on the Science and Technology of Emissive Displays and Lighting, 9-12 September 2008, Pagni de Tivoli- Rome (Italy).

18. HC Swart, BM Mothudi, S. Neiuwoudt, JJ Terblans, **OM Ntwaeaborwa,** Luminescent Properties and Degradation of $SrAl_2O_4$:$Eu^{2+}$,$Dy^{3+}$, 14th Intenrational Workshop on organic and Inorganic Electroluminescence & 2008 International Conference on the Science and Technology of Emissive Displays and Lighting, 9-12 September 2008, Pagni de Tivoli-Rome (Italy).

19. HC Swart, JJ Terblans, **OM Ntwaeaborwa**, E Coetsee, BM Mothudi, MS Dhlamini, 23rd International Conference on Atomic Collisions in Solids, 17-22 August 2008, Hans Merensky Estate-Kruger National Park (South Africa).

20. **OM Ntwaeaborwa,** HC Swart, RE Kroon, MS Dhlamini, JJ Terblans, BM Mothudi, PD Nsimama, M-M Biggs, PH Holloway, Synthesis, Characterization and Luminescence Properties of ZnO-$SiO_2$:PbS, AVS 55th International Symposium and Exhibitions, 19-24 October 2008, Boston-Massachauset (USA).

21. **OM Ntwaeaborwa,** MS Dhlamini, RE Kroon, BM Mothudi, PS Nsimama, MM Biggs, PS Mbule,HC Swart, Sol-gel synthesis and Luminescence Properties of ZnO-PbS, 3rd NanoAfrica Conference, 1-4 February 2009, CSIR-Pretoria (South Africa) .

22. **O.M. Ntwaeaborwa**, P.D. Nsimama , J.T. Abiade , E. Coetsee, H.C Swart, The effects of substrate temperature on the structure ,morphology and photoluminescence properties of pulsed laser deposited SrAl2O4:Eu2+,Dy3+ thin films, 3rd South African Conference on Photonic Materials, Mabula Lodge-South Africa, March 2009.

23. M.S. Dhlamini,**O.M.Ntwaeaborwa**, H.C.Swart, J.M.Ngaruiya, K.T. Hillie, Sensitized luminescence through nanoscopic effects of ZnO encapsulated in SiO2:Tb3+ sol gel derived phosphor, 3rd South African Conference on Photonic Materials, Mabula Lodge-South Africa, March 2009.

24. B.M. Mothudi, **O.M.Ntwaeaborwa**, J.R.Botha, H.C.Swart, Photoluminescence and phosphorescence properties of MAl2O4:Eu2+,Dy3+ (M=Ca,Ba,Sr) phosphors prepared at an initiating combustion temperature of 500 ºC , 3rd South African Conference on Photonic Materials ,Mabula Lodge-South Africa, March 2009.

25. P.D.Nsimama, **O.M. Ntwaeaborwa**, E.Coetsee, H.C.Swart, The influence of the number of pulses on the morphological and photoluminescence properties of SrAl2O4:Eu2+,Dy3+ thin films prepared by pulsed laser deposition, 3rd South African Conference on Photonic Materials, Mabula Lodge-South Africa, March 2009.

26. M.M. Biggs , **O.M.Ntwaeaborwa**, J.J.Terblans, H.C.Swart, Characterization and luminescent properties of SiO2:ZnS:Mn2+ and ZnS:Mn2+ nanophosphors synthesized by a sol–gel method, 3rd South African Conference on Photonic Materials, Mabula Lodge-South Africa, March 2009.

27. HC Swart, JJ Terblans, E Coetsee, V Kumar, MM Biggs, MM Biggs, **OM Ntwaeaborwa**, Auger electron Spectroscopy and X-ray Photoelectron Spectroscopy study of the electron stimulated surface chemical reaction mechanism for phosphor degradation, 13th European Conference on Application of Surface and Interface Analysis, Turkey, October 2009

28. **OM Ntwaeaborwa,** PD Nsimama, HC Swart, Photoluminescence Properties of pulsed laser deposited $SrAl_2O_4$:Eu,Dy thin films, 56th Sympossium of the American Vacuum Society, 8-13 Nov 2009, San Jose (USA).

29. **OM Ntwaeaborwa**, Vinay Kumar, Shreyas Pitale, GH Mhlongo, RE Kroon, HC Swart, Enhanced photoluminescence of rare-earth activators in sol-gel derived $SiO_2$ by energy transfer from ZnO nanoparticles and co-activators, *International Conference on Nanomaterials: Synthesis, Characterization and Applications*, 27-29 April 2010, Kottayam, Kerala, India.

30. Shreyas S. Pitale, Vinay Kumar, Indrajit Nagpure, **O.M. Ntwearborwa** and H.C. Swart. Luminescence characterization and electron beam induced chemical changes on the surface of ZnAl2O4: Mn nanocrystalline phosphor, *International Conference on Nanomaterials: Synthesis, Characterization and Applications*, 27-29 April 2010, Kottayam, Kerala, India.

31. Vinay Kumar, Shreyas S. Pitale, I.M. Nagpure, **O.M. Ntwaeaborwa** and H.C. Swart. Luminescence and electron beam induced degradation of alkaline earth sulfide based nanophosphors. *International Conference on Nanomaterials: Synthesis, Characterization and Applications*, April 2010, Kottayam, Kerala, India.

32. **OM Ntwaeaborwa**, PD Nsimama, JJ Dolo, MS Dhlamini, E Coetsee, JJ Terblans, HC Swart, Cathodoluminescence and Photoluminescence properties of pulsed laser deposited thin films, t.

33. Dolo, J.J., Swart, H.C., Coetsee, E., Terblans, J.J. and **Ntwaeaborwa, O.M.** *Effect of deposition conditions on the characteristics of the thin films grownobtained by using Pulsed Laser Deposition*, 3rd Joint International Conference on Hyperfine Interactions and International Symposium on Nuclear Quadrupole Interactions, Genève, Switzerland, HFI/NQI 2010, 13-17 September 2010.

34. Mhlongo, G.H**., Ntwaeaborwa, O.M.,** Dhlamini, M.S., Swart, H.C. and Hillie, T.K. *Cathodoluminescence degradation of $SiO_2$:$Pr^{3+}$-$Eu^{3+}$ nanophosphor and quenching of $Pr^{3+}$ (3H6→3P0) emission due to $Eu^{3+}$ co-doping*, Excited States of Transition Elements, ESTE 2010 and Workshop on Luminescence, Wrocław & Piechowice, Poland, 04-09 September 2010

35. **Mothudi, B.M., Ntwaeaborwa, O.M. and Swart, H.C.** 2010. *Luminescent properties of $BaAl_2O_4$:$Eu^{2+}$,$Gd^{3+}$ phosphors prepared with the combustion method at different initiating combustion temperatures (400 – 1000 °C)*, I International Conference on New Trends in Luminescence and Phosphor Materials (LUMIPHOM 2010), Hermosillo, Mexico, October 4th-8th, 2010.

36. **Biggs, M.M., Ntwaeaborwa, O.M., Swart, H.C. and Hoffman, M.J.H.** 2010. *Luminescent mechanism of bulk and nano ZnS:$Mn^{2+}$ phosphors*, Nanotech Conference and Expo, June 21-24, 2010, Anaheim, CA, USA.

37. J. J. Dolo, H.C. Swart, E. Coetsee, JJ Terblans and **OM Ntwaeaborwa**, Effect of deposition conditions on the characteristics of the thin films grownobtained by using Pulsed Laser Deposition, 3rd Joint International Conference on Hyperfine Interactions and International

Symposium on Nuclear Quadrupole Interactions, Genève, Switzerland, HFI/NQI 2010, 13-17 September 2010.

38. K.G. Tshabalala, S. Cho, J.K. Park, S Pitale, I.M. Nagpure, R.E. Kroon, H.C. Swart, **O.M. Ntwaeaborwa**, Optical properties of UV down-converting ZnAl2O4:Ce3+,Tb3+ phosphor, XVIII Advanced Display Technologies 15th Int'l Workshop on Inorganic and Organic Electroluminescence 2010 Int'l Conference on the Science and Technology of Emissive Displays and Lighting, September 27 Sept – 1 October , 2010, St. Petersburg, Russia

39. P.D. Nsimama, **O.M. Ntwaeaborwa** and H.C Swart, Characterization of laser ablated $SrAl_2O_4:Eu^{2+},Dy^{3+}$ thin films, 3rd ALC Student Workshop 2010, Stellenbosch 24 and 25 of September 2010.

40. **OM Ntwaeaborwa**, Renjia Zhou, Lei Qian, Shreyas S. Pitale, J Xue, HC Swart, PH Holloway, Post-fabrication annealing effects on the performance of P3HT:PCBM solar cells with/without ZnO nanoparticles, 4th South African Conference on Photonic Materials, Kariega Game Lodge-South Africa, 2-6 May 2011.

41. PA Moleme, Shreyas S. Pitale, HC Swart, **OM Ntwaeaborwa**, Investigation of ageing characteristics and identification of surface chemical changes on $SrGa_2S_4:Ce^{3+}$ display phosphor under electron beam bombardment, 4th South African Conference on Photonic Materials, Kariega Game Lodge-South Africa, 2-6 May 2011

42. P.S. Mbule, G.H. Mhlongo, Shreyas S. Pitale, H.C. Swart and **O.M. Ntwaeaborwa**, Sensitizing Effects of ZnO Quantum Dots on Red-Emitting $Pr^{3+}$-doped $SiO_2$ Phosphor, 4th South African Conference on Photonic Materials, Kariega Game Lodge-South Africa, 2-6 May 2011
43. M.M. Duvenhage, **O.M. Ntwaeaborwa** and H.C. Swart, UV exposure and photon degradation of $Alq_3$ powders, 4th South African Conference on Photonic Materials, Kariega Game Lodge-South Africa, 2-6 May 2011

44. Shreyas S. Pitale, Mukut Gohain, I.M. Nagpure, **O.M. Ntwaeaborwa**, Barend C.B. Bezuidenhoudt and H.C. Swart, A Comparative study on Structural, morphological and luminescence characteristics of $Zn_3(VO4)_2$ phosphor prepared via hydrothermal and citrate-gel combustion routes, 4th South African Conference on Photonic Materials, Kariega Game Lodge-South Africa, 2-6 May 2011
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52. MS Dhlamini, GH Mhlongo, HC Swart, **OM Ntwaeaborwa** and KT Hillie, Concentration effect of $Tm^{3+}$ on cathodoluminescence properties of $SiO_2:Tm^{3+}$ and $SiO_2:Ho^{3+},Tm^{3+}$ systems, 4th South African Conference on Photonic Materials Kariega Game Lodge-South Africa, 2-6 May 2011,
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63. HC Swart, MA Gusowski, JJ Terblans, **OM Ntwaeaborwa**, Ultraviolet studies and Quantum cutting effect in $NaYF_4:In^{3+}$ Nanocrystals, 2nd International Conference on Nanostructured Materials and Devices, 11-15 Dec 2011, Hawaii-USA

64. PS Mbule, T Kim, B-S Kim, HC Swart, **OM Ntwaeaborwa**, Effects of ZnO nanoparticles and flake-like morphology on the performance of organic solar cell devices, 4th International Conference on Nanoscience and Nanotechnology, 1-4 April 2012, Bloemfontein – South Africa

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69. **O.M. Ntwaeaborwa**, HC Swart, BM Mothudi, Overview of long afterglow phosphors, International Conference on Luminescence, Courtyard Hotel- Port Elizabeth, 1-6 July 2012

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78. P.S. Mbule, H.C. Swart, O.M. Ntwaeaborwa, Sensitizing effects of ZnO quantum dots on red emitting $Pr^{3+}$-doped $SiO_2$ phosphor, International Conference on Luminesence, 1-6 July 2012, Port Elizabeth, South Africa.
79. P.S. Mbule[1], T.-H. Kim[2], B.-S. Kim[2], H.C. Swart[1] and **O.M. Ntwaeaborwa[1]** Comparison study on the performance of conventional and inverted organic solar cells and their surface analysis by TOF-SIMS technique, Techconnec World, Summit and Innovation, 12-16 May 2013, Washington DC, USA.
80. Marc Plaisant, **O.M. Ntwaeaborwa**, H.C. Swart, , P.H. Holloway, Near-UV to visible luminescent signature of coalesced $Cd_xZn_{1-x}Se$ nano-rod heterogeneous alloys, 5th South African Conference on Photonic Materials, 29 April – 3 May 2013, Kariega Game Reserve, South Africa
81. L.L. Noto, O.M. Ntwaeaborwa, J.J. Terblans and H.C. Swart, Optimization of the luminescent intensity of $ZnTa_2O_6:Pr^{3+}$ phosphor, 5th Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, May 2013.
82. P.S. Mbule, T.-H. Kim, B.-S. Kim, H.C. Swart and O.M. Ntwaeaborwa, Effects of ZnO buffer layer and depth profiling analysis of bulk heterojunction organic solar cells, NSTI-2013 - Nanotechnology Conference and Expo, Washington DC, 12-16 May 2013
83. SV Motloung, FB Dejene, HC Swart, OM Ntwaeaborwa, Effects of Zn:catalyst molar ratio on ZnAl2O4:0.05% Cr3+ nanocrystals synthesized using sol-gel process, 5th Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, May 2013.
84. P.P. Mokoena, I.M. Nagpure, Vinay Kumar, H.C. Swart, O.M. Ntwaeaborwa, Luminescent properties of Ca5(PO4)3(OH):$Gd^{3+}$,$Pr^{3+}$ phosphor prepared by wet chemistry method, 5th Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, May 2013.
85. S.K.K. Shaat, H.C. Swart and O.M. Ntwaeaborwa, Tunable and white emission from Mg0.3Sr0.7Al2O4:Tb3+,Eu3+ phosphor for LED applications, 5th Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, May 2013.
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88. Marc Plaisant, O.M. Ntwaeaborwa, H.C. Swart and Paul H. Holloway, Nanostructure of CdxZn1-xSe Heterogeneous Nanorods, 5th Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, May 2013.
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90. B.M. Mothudi, M. A Lephoto, O.M. Ntwaeaborwa, M.S. Dhlamini and H.C. Swart, Effect of $Ba^{2+}$ and Zn2+ concentrations on structure and luminescence properties of $Ba_{(1-x)}Zn_xAl_2O_4:Eu^{2+},Nd^{3+}$ prepared by combustion method, 5th Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, May 2013.
91. M.S. Dhlamini, B.M. Mothudi, G.H. Mhlongo, O.M. Ntwaeaborwa, H.C. Swart and K.T. Hillie, Preparation and characterization of luminescence properties of $CaAl_2O_4:Eu^{2+},Tm^{3+}$ phosphors powder, 5th Conference on Photo-Responsive Materials, Kariega Game Reserve, South Africa, May 2013.
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97. 46. H.C. Swart, J.J. Terblans, O.M. Ntwaeaborwa, R.E. Kroon, I.M. Nagpure, Vinod Kumar and Vinay Kumar, Applications of AES, XPS and TOF SIMS to phosphor materials, 15th European Conference on Applications of Surface and Interface Analysis 2013, ECASIA'13, Forte Village Resort, Sardinia, Italy, October 13 – 18, 2013.
98. MA Tshabalala, H.C. Swart, O.M. Ntwaeaborwa, Generation of white light from $Sr_2SiO_4$ doped with lanthanides, 60th symposium of the American Vacuum Society, 27 Oct – 01 Nov 2013, Long Beach – Los Angeles, USA
99. H.C. Swart, J.J Terblans, O.M. Ntwaeaborwa, A. Yousif, S.T.S. Dlamini, E. Coetsee and R.E. Kroon, Luminescent properties of phosphor nano thin films, 1st International Symposium on Nanoparticles / Nanomaterials and Applications, ISN2A 2014, 20-22 January 2014. **(invited)**
100. Palvi Gupta, A.K. Bedyal, Vinay Kumar, Y. Khajuria, O.M. Ntwaeaborwa and H.C. Swart, Photoluminescence of $K_3La(PO_4)_2:Eu^{3+}$ Nanophosphors Synthesized by Combustion Method, 58th DAE Solid State Physics Symposium (DAE-SSPS-2013) Thapar University, Patiala, India, December 17-21, 2013, AIP conference proceedings.
101. Neharika, Vinay Kumar, O.M. Ntwaeaborwa and H.C. Swart, Synthesis and Photoluminescence Study of $Dy^{3+}$ doped $Sr_3B_2O_6$: nanophosphors, 58th DAE Solid State Physics Symposium (DAE-SSPS-2013) Thapar University, Patiala, India, December 17-21, 2013, AIP conference proceedings.
102. Mohit Manhas, Vinay Kumar, O.M. Ntwaeaborwa and H.C. Swart, Synthesis and Photoluminescence Properties of $Ca_3B_2O6:Tb^{3+}$ Nanophosphors, 58th DAE Solid State

Physics Symposium (DAE-SSPS-2013) Thapar University, Patiala, India, December 17-21, 2013, AIP conference proceedings.

103. Pontsho S Mbule, Taehee Kim, BongSoo Kim, Hendrik C Swart and Martin O Ntwaeaborwa, Comparison study on the performance of conventional and inverted organic solar cells and their surface analysis by TOF-SIMS technique, 2nd Southern African Solar Energy Conference (SASEC 2014), Pine Lodge Resort and Conference Centre, Nelson Mandela Bay, 27th - 29th of January 2014.
104. Vijay Kumar, Vinod Kumar, S. Som, Mukut Gohain, O.M. Ntwaeaborwa, E Coetsee and H.C. Swart, Effect of Annealing on the Defect Concentration of Microwave Induced Synthesized Zinc Oxide Nanophosphors Effects of Microwave and Air Annealing on the Structural, Magnetic and Optical Properties of Iron Pyritohedron Crystal, International conference on structural and Physical properties of solids, Indian School of mines (ISM) Dhanbad, 826004, India, November 18th – 20th, 2013.
105. P.P. Mokoena, Mukut Gohain, Vinay Kumar, Barend Bezuidenhout, H.C. Swart O.M. Ntwaeaborwa, Enhancement of Ultraviolet B emission from $Ca_3(PO_4)_2:Gd^{3+},Pr^{3+}$, 5th International Conference on Nanoscience and Nanotechnology, 30 March – 02 April 2014, Quest Conference Estate – Vanderbijl Park, South Africa.
106. S.N. Ogugua, S.K.K. Shaat, H.C. Swart, O.M. Ntwaeaborwa, Blue light excited $LaGdSiO_5:Dy^{3+}$ white light emitting nanophosphors synthesized via combustion method, 30 March – 02 April 2014, Quest Conference Estate – Vanderbijl Park, South Africa.
107. HC Swart, JJ Terblans, E Coetsee, WD Roos, OM Ntwaeaborwa, RE Kroon, S Cronje, EP Barnard, PHI systems and their modifications at KOVSIES, PHI European User Meeting, Commundo Tagungshotel, Ismaning (Munich), Germany, May 14 - 15, 2014 (**Invited talk**).

108. P.S. Mbule, H.C. Swart, and **O.M. Ntwaeaborwa,** P3HT:PBCM Based Solar Cells: A short review focusing on ZnO Nanoparticles Buffer Layer, Post-fabrication Annealing and an Inverted Geometry, Energy Materials Nanotechnology Conference, Xijiao Hotel, Beijing-China, 12 – 15 May 2014. (**Invited**)

109. P.P. Mokoena, H.C. Swart, **O.M. Ntwaeaborwa,** Improved ultraviolet emission form $Gd^{3+}$-$Pr^{3+}$ co-activated calcium phosphate phosphors for application in phototherapy lamps, From Solid State to Biophysics: 7th International Conference, 7 – 14 June, Hotel Croatia, Dubrovnik – Croatia **(Invited)**
110. M.A. Tshabalala, H.C. Swart, Vinod Kumar, O.M. Ntwaeaborwa, Photoluminescent Properties of $Sr_2SiO_4$:Dy/Tb/Eu thin films prepared by the sol-gel spin-coating technique, 61st American Vacuum Symposium, 9-14 November 2014, Baltimore – USA
111. P.P. Mokoena, M.L. Chithambo, B.K. Mothudi, H.C. Swart, **O.M. Ntwaeaborwa**. Investigation of luminescent properties of $Ca_5(PO_4)_3OH:Gd^{3+},Pr^{3+}$ phosphor for application in displays, phototherapy lamps and thermoluminescence dosimetry, 61st American Vacuum Society Symposium, 9-14 November 2014, Baltimore – USA
112. S.N. Ogugua, S.K.K. Shaat, H.C, Swart, **O.M. Ntwaeaborwa**, White light emitting $LaGdSiO_5:Dy^{3+}$ nanophosphors for solid state lighting applications, 5-7 May 2015, Mabula Game Reserve, South Africa, **Best Poster Presentation Award**

113. R.L. Nyenge, H.C. Swart, **O.M. Ntwaeaborwa,** Influence of Substrate Temperature and Deposition pressure on Pulsed laser deposited thin films of $CaS:Eu^{2+}$ phosphors, 5-7 May 2015, Mabula Game Reserve, South Africa,

114. M-M Duvenhage, J.J. Terblans, O.M. Ntwaeaborwa, H.C. Swart, XPS investigation of $Znq_2$ green organic phosphor, 5-7 May 2015, Mabula Game Reserve, South Africa,

115. A Yousif, S. Som, O.M. Ntwaeaborwa, H.C. Swart, Luminescence properties of $CaO:Bi^{3+}$ phosphor, 5-7 May 2015, Mabula Game Reserve, South Africa,

116. P.S. Mbule, B.K. Mothudi, S.M. Dhlamini, H.C. Swart, **O.M. Ntwaeaborwa,** P3HT:PBCM Based Solar Cells: A short review focusing on ZnO Nanoparticles Buffer Layer, Post-fabrication Annealing and an Inverted Geometry, 3rd Southern African Solar Energy Conference, 11-13 May 2015 – Kruger National Park, **Invited – Best Oral presentation award.**

117. Vinod Kumar, Vijay Kumar, Anugar Pandey, L.P. Porohit, **O.M. Ntwaeaborwa**, H.C. Swart, Solution processed ZnO nanoparticles for DSSCs applications, 11-13 May 2015 – Kruger National Park

118. P.S. Mbule, H.C. Swart, **O.M. Ntwaeaborwa**, Bulk Heterojunction organic solar cells with ZnO nanoparticles buffer layers for improved efficiency, 4th International Conference on Energy Challenges and Mechanics, 11-14 August 2015, Aberdeen – Scotland (UK) – **Invited, chair of plenary session,**

119. S.N. Ogugua, S.K.K. Shaat, H.C. Swart, **O.M. Ntwaeaborwa**, Synthesis and characterization of multicolour and white light emitting $R_2SiO_5:Dy^{3+}$ (R = La, Gd, Y) phosphors, Advanced Materials World Conference, August 2015, Stockholm (Sweden) – Helsinki (Finland)

120. R.L. Nyenge, H.C. Swart, **O.M. Ntwaeaborwa**, Cathodoluminescence and Photoluminescence of Pulsed laser Deposited thin films Phosphors, International Conference on Laser Ablation, 30 August – 04 September 2015, Cairns-Australia

121. **O.M. Ntwaeaborwa**, Luminescent Properties of Powder and Pulsed Laser Deposited Thin Film Phosphors and their Applications in Lighting, Displays and Solar Cells, International Conference on Materials Science, **Invited talk**, , 14-16 September 2015, Orlando – USA

122. S.N. Ogugua, H.C. Swart, R.L. Nyenge, **O.M. Ntwaeaborwa**, Surface characterization and luminescent properties of pulsed laser deposited $La_{0.5}Gd_{1.5}SiO_5:Dy^{3+}$ thin films, 62 American Vacuum Society Symposium, 18-23 October 2015, San Jose – USA.

123. M.A. Tshabalala, H.C. Swart, S.M. Dhlamini, **O.M. Ntwaeaborwa**, Structure, surface analysis, photoluminescent properties and decay characteristics of $Tb^{3+}$-$Eu^{3+}$ co-activated $Sr_2MgSi_2O_7$ phosphor, 62 American Vacuum Society Symposium, 18-23 October 2015, San Jose – USA.

124. O.M. Ntwaeaborwa, Preparation and Characterization of Gadolinium and Praseodymium Co-activated Calcium Phosphate Phosphors for Application in Phototherapy Lamps, National Conference on Luminescence – India – 18-20 February 2016. – Invited talk

125. **O.M. Ntwaeaborwa**, Tunable emission and surface characterization of powders and pulsed laser deposited mixed rare-earths oxyorthosilicate phosphors, Colaborative conference on Materials Research, 26-30 June 2017, Jeju Island – South Korea, **Invited talk**

126. **O.M. Ntwaeaborwa**, Organic solar cells: Historical Perspectives, recent developments and concepts for improvement, 6th International Workshop in Plasmonics and nanomaterials for solar cells, 04 Nov 2017, Enricho Fermi Centre for Study and Research, Rome-Italy, Invited talk.

127. **OM Ntwaeaborwa.** Spectroscopic properties of rare-earths doped nanocomposites for solar cell applications, 7th International Workshop on Photoluminescence and Rare-Earths: Photonic Materials and Devices, 30 Nov – 02 Dec 2017, Rome-Italy, Invited Talk
128. **OM Ntwaeaborwa**, P3HT:PCBM Based solar cells: A short review focusing on ZnO nanoparticles buffer layer , post deposition annealing and inverted geometry, 5th International Workshop in Plasmonics and Nanoantenaes for solar cell applications, 9 May 2017, Wits University – Johannesburg, Invited talk
129. **O.M Ntwaeaborwa,** Effect of nanoscale morphology of ZnO electron transport layer on the power conversion efficiency of bulk heterojunction organic solar cells, International Symposium on Nanoparticles/Nanomaterials and Applications, 22-25 January 2018, Lisbon-Portugal, Invited talk
130. **O.M Ntwaeaborwa,** Lighting the future: Perspectives on solid state lighting, energy efficiency and phototherapy, 63rd Annual Conference of the South African Institute of Physics, 25-29 June 2018, Bloemfontein South Africa, Invited Talk
131. **O.M Ntwaeaborwa,** Luminescent nanomaterials and their applications, 30th Annual Congress on Nanotechnology and Nanomaterials, 11-12 September 2018, Stockholm-Sweden, Plenary Talk
132. **O.M. Ntwaeaborwa**, Upconversion/Downconversion nanomaterials for solar cells and phototherapy application, AVS (American Vacuum Society) 65 International Symposium and Exhibition, 21-26 October 2018, Long Beach – Los Angeles, Invited Talk
133. **OM Ntwaeaborwa,** Simon Ogugua, Hendrik Swart, Effect of post-preparation annealing on powders and pulsed laser deposited thin films of rare-earths oxyothosilicate phosphors doped with rare-earths, , 8th International Workshop on Photoluminescence in rare-earths, 4- 6 September 2019, Hotel Astona La Scala, Nice (France).
134. **O.M Ntwaeaborwa,** Simon Ogugua, Hendrik Swart, Influence of post deposition annealing on the structure and photoluminescence properties of $Dy^{3+}$ and $Pr^{3+}$ doped rare-earth oxyorthosilicates ($R_2SiO_5$) (R = La, Gd, Y) thin film phosphors, AVS 66th International Symposium and Exhibition, 20 -25 October, Columbus-Ohi, USA

**Local Conferences**

1. **OM Ntwaeaborwa**, ND Kgwadi and R Strydom, Measurement of radon gas in Mmabatho houses, University of Port Elizabeth, Port Elizabeth, (1999)

2. **OM Ntwaeaborwa**, ND Kgwadi, SH Taole, R Strydom, Measurement of the Equilibrium Factor between Radon and its Progeny in the Underground mining environment, Rand Afrikaans Univeristy, Johannesburg, (2001)

3. **OM Ntwaeaborwa**, GN van Wyk, WD Roos, JJ Terblans, AP Greeff and HC Swart, All systems go at Kovsies- An overview of research techniques, University of Potchefstroom, Potchefstroom (2002)

4. **OM Ntwaeaborwa**, PH Holloway, J Bang, HC Swart and RE Kroon, Enhanced photoluminescence of $Eu^{3+}$ and $Ce^{3+}$ induced by energy transfer from ZnO nanoparticles

encapsulated in $SiO_2$, 50th Annual Conference of the South African Institute of Physics, University of Pretoria, Pretoria, 2005

5. E Coetsee, JJ Terblans, **OM Ntwaeaborwa**, U Buttner and HC Swart, Characterization of Pulsed Laser Ablated Cerium doped Yttrium Silicate ($Y_2SiO_5$:Ce) thin films on Si (100). 50th Annual Conference of the South African Institute of Physics, University of Pretoria, Pretoria , July 2005

6. S Nieuwoudt, HC Swart, JJ Terblans, **OM Ntwaeaborwa**, E Coetsee and KT Hillie, Luminescent properties of nanoparticle $SrAl_2O_4:Eu^{2+},Dy^{3+}$ phosphor, 52nd Annual Conference of the South African Institute of Physics, University of Western Cape, Cape Town, 2006.

7. E Coetsee, HC Swart, JJ Terblans, **OM Ntwaeaborwa**, KT Hillie and U. Buttner, Cathodoluminescence of $Y_2SiO_5$:Ce thin films, 52nd Annual Conference of the South African Institute of Physics, University of Western Cape, Cape Town, 2006.

8. **OM Ntwaeaborwa**, HC Swart, RE Kroon, PH Holloway, JR Botha, Enhanced luminescence and degradation of $SiO_2$:Ce,Tb powder phosphors prepared by a Sol-gel process, 52nd Annual Conference of the South African Institute of Physics, University of Western Cape, Cape Town, 2006. (***Best oral PhD presentation award***)

9. **OM Ntwaeaborwa**, S Khalim, M Chen, DE Johnston, HC Swart, AT Johnson, Chemical vapour deposition growth of single wall carbon nanotubes, 52nd Annual Conference of the South African Institute of Physics, University of Western Cape, Cape Town, 2006.

10. S. Niewoudt, JJ Terblans, **OM Ntwaeaborwa**, E Coetsee, KT Hillie, HC Swart, Luminescent properties of of nanoparticle $SrAl_2O_4:Eu^{2+},Dy^{3+}$ phosphor, 52nd Annual Conference of the South African Institute of Physics, University of Witwatersrand, Johannesburg, 2007.

11. BM Mothudi, **OM Ntwaeaborwa**, BF Dejene, HC Swart, Synthesis and characterization of $SrAl_2O_4$:Eu,Dy, 52nd Annual Conference of the South African Institute of Physics ,University of Witwatersrand, Johannesburg, 2007.

12. MS Dhlamini, JJ Terblans, **OM Ntwaeaborwa**, HC Swart, Luminescent studies of $SiO_2$:PbS nanoparticles grown on Si(100) by pulsed laser deposition, 52nd Annual Conference of the South African Institute of Physics University of Witwatersrand, Johannesburg, July 2007.

13. MS Dhlamini, JJ Terblans, **OM Ntwaeaborwa**, HC Swart, Photloluminescence properties of $SiO_2$ surface passivated PbS nanopaticles, 52nd Annual Conference of the South African Institute of Physics University of Witwatersrand, Johannesburg, 2007.

14. BM Mothudi, **OM Ntwaeaborwa**, HC Swart, Characterization of $SrAl_2O_4:Eu^{2+}$ and $SrAl_2O_4:Eu^{2+},Dy^{3+}$ prepared via combustion method, 53rd Annual Conference of the South African Institute of Physics, University of Limpopo, July 2008

15. BM Mothudi, **OM Ntwaeaborwa**, HC Swart, Characterization of $SrAl_2O_4:Ce^{3+}$ prepared via combustion method, 53rd Annual Conference of the South African Institute of Physics, University of Limpopo, July 2008.

16. PS Mbule, HC Swart, JJ Terblans, **OM Ntwaeaborwa**, Sol-gel synthesis and luminescence properties of $Pr^{3+}$ in $SiO_2$, 53rd Annual Conference of the South African Institute of Physics, University of Limpopo, July 2008

17. MM Biggs, HC Swart, JJ Terblans, **OM Ntwaeaborwa**, Luminescence mechanisms of nanoparticulate $ZnS:Mn^{2+}$ phosphors, 53rd Annual Conference of the South African Institute of Physics University of Limpopo, July 2008.

18. JJ Dolo, JJ Terblans, **OM Ntwaeaborwa**, HC Swart, Photoluminescence and structural study of $Gd_2O_2S:Tb$, 53rd Annual Conference of the South African Institute of Physics, University of Limpopo, July 2008.

19. GH Mhlongo, **OM Ntwaeaborwa**, TK Hillie, Photoluminescence properties of the sol-gel derive $Y_2O_3:Eu^{3+}$ nano-phosphors, 53rd Annual Conference of the South African Institute of Physics, University of Limpopo, July 2008.

20. Vinay Kumar, Varun Mishra, **OM Ntwaeaborwa**, HC Swart, Preparation and Luminescence studies of $CaS:Ce^{3+}$ nanophosphors, 54th Annual Conference of the South African Institute of Physics, University of Kwazulu-Natal, July 2009

21. P.D. Nsimama, **O.M. Ntwaeaborwa**, E. Coetsee and H.C Swart, The influence of deposition parameters on the properties of $SrO_2Al_4:Eu^{2+}$, $Dy^{3+}$ thin film phosphors prepared by the pulsed laser technique: Working atmosphere, 54th Annual Conference of the South African Institute of Physics, University of Kwazulu-Natal, Durban, July 2009

22. P.S Mbule, H.C Swart, J.J Terblans and **O.M Ntwaeaborwa**, Sol-gel synthesis and luminescence properties of $Pr^{3+}$ in different host matrices, 54th Annual conference of the South African Institute of Physics, University of Kwazulu-Natal, Durban, July 2009.

23. B.M Mothudi, **O.M. Ntwaeaborwa**, A. Kumar, J. R Botha, K. Sohn and H.C. Swart, Phosphorescence properties of long persistent $MAl_2O_4:Eu^{2+}$, $Re^{3+}$ (M = Ca, Ba, Sr) phosphors prepared by solid state reaction and combustion methods, 54th Annual Conference of the South African Institute of Physics, University of Kwazulu-Natal, Durban, July 2009

24. G.H Mhlongo, **O. M Ntwaeaborwa**, T.K Hillie, Luminescence enhancement of $Pr^{3+}$ in $SiO_2$ by energy transfer from ZnO nanoparticles, 54th Annual Conference of the South African Institute of Physics, University of Kwazulu-Natal, Durban, July 2009.
25. JJ Dolo, **OM Ntwaeaborwa**, JJ Terblans, FB Dejene, HC Swart, The effects of oxygen pressure on the structure, morphology and photoluminescence intensity of pulsed laser deposited $Gd_2O_2S:Tb^{3+}$, 54th Annual Conference of the South African Institute of Physics, University of Kwazulu-Natal, Durban, July 2009
26. I.M. Nagpure, O.M. Ntwaeaborwa, S.S. Pitale, Vinay Kumar and H.C. Swart Luminescence studies of $CaQ_2$ organic phosphor for OLED applications. Pretoria (2010)
27. Shreyas S. Pitale, Vinay Kumar, Indrajit Nagpure, O.M. Ntwaeaborwa, H.C. Swart, CL stability and surface chemical changes of ZnAl2O4:Mn nanocrystalline phosphor. Pretoria (2010).
28. PA Moleme, HC Swart, OM Ntwaeaborwa, Cathodoluminescence degradation of $SrGa_2S_4:Ce^{3+}$ powder phosphor. Pretoria (2010)
29. B.M Mothudi, O.M. Ntwaeaborwa and H.C. Swart, The influence of the initiaiting and the annealing temparature on the luminescent and structural properties of $BaAl_2O_4:Eu^{2+},Nd^{3+},Gd^{3+}$ phosphors prepared by combustion method. Pretoria (2010)
30. P.D. Nsimama, O.M. Ntwaeaborwa, H.C. Swart. Elemental composition analysis, morphological, and photoluminescence properties of pulsed laser ablated $SrAl_2O_4:Eu^{2+},Dy^{3+}$ thin films. Pretoria (2010)
31. K.G. Tshabalala, H.C. Swart, S. Cho, J.K. Park and **O.M. Ntwaeaborwa**, Luminescence properties of $Ce^{3+}$ and $Tb^{3+}$ –doped ZnAl2O4 phosphors prepared by combustion reaction. Pretoria (2010)
32. P.S Mbule, R.E Kroon, H.C Swart and **O.M Ntwaeaborwa**, Ex situ synthesis and optical properties of ZnO-PbS nanocomposites. Pretoria (2010).
33. Hassan Seed Ahmed, Ted Kroon, **Martin Ntwaeaborwa**, Mart-Mari Duvenhage Luminescence from rare-earth doped silica prepared by the sol-gel method. Pretoria (2010)
34. Nsimama, P.D**., Ntwaeaborwa, O.M**. and Swart, H.C**.** 2010. *Characterization of laser ablated $SrAl_2O_4:Eu^{2+},Dy^{3+}$ thin films*, 3rd ALC Student Workshop 2010, Stellenbosch 24 and 25 of September 2010.
35. PS Mbule, HC Swart, **OM Ntwaeaborwa**, Organic solar cells: An overview of organic solar focusing on metal oxide buffer layer and postfabrication annealing, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
36. PS Mbule, GH Mhlongo, HC Swart, **OM Ntwaeaborwa**, Low Temperature Synthesis of ZnO nanoparticles and Nanorods via Wet Chemistry Route, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
37. Lephoto M.A, **Ntwaeaborwa O.M**., Swart H.C., Botha J.R., Mothudi B.M, Synthesis and photoluminescence studies of $(Ba_{1-x}Sr_x)Al_2O_4: Eu^{2+}; Nd^{3+}$ prepared by combustion method, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa

38. K.G. Tshabalala, S.-H. Cho, J.K. Park, H.C. Swart, **O.M. Ntwaeaborwa**

Enhanced green emission from UV down-converting $Ce^{3+}$-$Tb^{3+}$ co -activated $ZnAl_2O_4$ phosphor, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa

39. J.J. Dolo, F.B. Dejene, J.J Terblans, **O.M. Ntwaeaborwa** and H.C. Swart, X-ray photoelectron spectroscopy analysis of $Gd_2O_2S:Tb^{3+}$, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
40. G H Mhlongo, M S Dhlamini, **O M Ntwaeaborwa**, H C Swart, P Solarz, W Ryba-Romanowski, K T Hillie, The influence of $Pr^{3+}$ co-doping on the photoluminescence and cathodoluminescence properties of $SiO_2:Tb^{3+}/Eu^{3+}$, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
41. G H Mhlongo, M S Dhlamini, O M Ntwaeaborwa, H C Swart, R E Kroon, P Solarz, W Ryba-Romanowski, K T Hillie, The influence of ZnO and $Ce^{3+}$ incorporation on the photoluminescence and cathodoluminescence intensity of $Pr^{3+}$ doped $SiO_2$, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
42. Lephoto M.A, Ntwaeaborwa O.M., Swart H.C., Mhlongo G.H, Mothudi B.M, Synthesis and Photoluminescence studies of $Ba_{1-x}Sr_xAl_2O_4:Eu^{2+},Nd^{3+}$ phosphor prepared by combustion method, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
43. S.K K. Shaat, F. Roelofse, H.C. Swart and O.M. Ntwaeaborwa, Synthesis and photoluminescence properties of $Tb^{3+}$- doped $Zn_{0.5}Sr_{0.5}Al_2O_4$ nanocrystal phosphor prepared by combustion method, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
44. M M Duvenhage, O M Ntwaeaborwa and H C Swart, Blended thin films of tris – (hydroxyquinoline) aluminium (Alq3) embedded in polymethyl methacrylate (PMMA), 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
45. I.M. Nagpure, Shreyas S. Pitale, Liza Coetzee, O. M. Ntwaeaborwa, JJ Terblans, and H. C. Swart, Low voltage electron beam induced degradation and surface surface chemical changes of $Zn_3(PO_4)$:Tb phosphor, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
46. PA Moleme, HC Swart, OM Ntwaeaborwa, Optical properties of $SrGa_2S_4:Ce^{3+}$ films prepared by pulsed reactive cross laser ablation (PRCLA) technique, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
47. HAA Seed Ahmed, WD Roos , OM Ntwaeaborwa, HC Swart and RE Kroon, Effect of annealing on the $Ce^{3+}/Ce^{4+}$ ratio measured by XPS in luminescent $SiO_2$:Ce, 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa
48. L.L. Noto , S.S. Pilate, M.A. Gusowski, J.J. Terblans', O.M. Ntwaeaborwa & H.C. Swart The enhancement of $Pr^{3+}$ red emission by adding $In^{3+}$ as a co-dopant in $CaTiO_3:Pr^{3+}$

phosphor**,** 56th annual conference of the South African Institute of Physics, 12-16 July 2011, Saint George Hotel – Irene, South Africa

49. K.G. Tshabalala, O.M. Ntwaeaborwa, H.C. Swart, Energy transfer from $Ce^{3+}$ to $Tb^{3+}$ in low quartz and amorphous $SiO_2$ hosts, 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa
50. M.S. Dhlamini, G.H. Mhlongo, B.M. Mothudi, O.M. Ntwaeaborwa, H.C. Swart and K.T. Hillie. Comparative study of luminescence properties of $Eu^{2+}$, $Dy^{3+}$ and $Tm^{3+}$ co-doped $CaAl_2O_4$ powder phosphors. Pretoria 2012
51. S.V. Motloung, F.B. Dejene, H.C. Swart and O.M. Ntwaeaborwa, Sol-gel synthesis and Characterization of Structural and Luminescence Properties of $ZnAl_2O_4$ singly doped with $Mn^{2+}$, $Cr^{2+}$, or $Pb^{2+}$ powder phosphors. Pretoria 2012.

52. Shaat SKK, Swart HC and Ntwaeaborwa OM, A new white light emitting nanophosphor , 57th annual conference of the South African Institute of Physics, **9-**13 July 2012, University of Pretoria, South Africa**.**
53. M-M Duvevenhage, O M Ntwaeaborwa, E Wrzesniewski, J Xue and H C Swart, The effect of nano sized $Alq_3$ on the external quantum and power conversion efficiencies of OLEDs, 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa
54. M.A. Tshabalala[2], B.F. Dejene, O.M. Ntwaeaborwa, H.C. Swart, Effects of annealing temperature on the optical properties of ZnO, 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa.
55. L.L. Noto, S.S Pitale, O.M. Ntwaeaborwa and H.C. Swart, $Pr^{3+}$ luminescence in a $GdTaO_4$ host**,** 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa.
56. SV Motloung, FB Dejene, HC Swart, OM Ntwaeaborwa, Sol-gel synthesis and Characterization of Structural and Luminescence Properties of $ZnAl_2O_4$ doped with $Mn^{2+}$ powder phosphor**,** 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa.

57. Yousif, H.C Swart and O.M Ntwaeaborwa, Influence of working atmosphere on $Y_3(Al,Ga)_5O_{12}$:Tb thin films grown by PLD technique, 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa.
58. **S**.T.S. Dlamini, H.C. Swart,O.M. Ntwaeaborwa, Morphological and Luminescent properties of $Y_3(AlGa)_5O_{12}:Ce^{3+}$ powder phosphor, 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa.
59. P.P. Mokoena, I.M.Nagpure, H.C. Swart and O.M Ntwaeaborwa, Synthesis and characterization of a narrowband $Ca_5$ $(PO_4)_3(OH):Gd^{3+}$, $Pr^{3+}$ phosphor for medical applications, 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa.

60. P.S. Mbule, T.-H. Kim, B.-S. Kim, H.C. Swart[1] and O.M. Ntwaeaborwa, Thickness and Solvent influence on the photo-active layer in Organic photovoltaic devices, 57th annual conference of the South African Institute of Physics, 9-13 July 2012, University of Pretoria, South Africa.

61. M.C.Manaka, M.S, Dhlamini, O.M. Ntwaeaborwa, H.C. Swart and B.M, Mothudi. Thermoluminescent properties of $CaAl_2O_4:Eu^{3+}$, ($Dy^{3+}$,$Sm^{3+}$) phosphors prepared by solid state reaction. Pretoria 2012.

62. M.M. Duvenhage, O.M. Ntwaeaborwa, H.C. Swart, D. Visser, J. Swarts and P. Swarts. 2013. The effect of EWG and EDG on the HOMO and LUMO levels of Alq3. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July.
63. S. Shaat, O.M. Ntwaeaborwa and H.C. Swart. 2013. White Cathodoluminescence $Zn_{0.3}Mg_{0.7}Al_2O_4:Tb^{3+};Eu^{3+}$ phosphor. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July.
64. M.S. Dhlamini, B.M. Mothudi, G.H. Mhlongo, O.M. Ntwaeaborwa, H.C. Swart and K. T. Hillie. 2013. Synthesis and characterization of luminescence properties of $CaAl_2O_4:Eu^{2+},Tm^{3+}$ phosphors Powder. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July.
65. P.S. Mbule, H.C. Swart and O.M. Ntwaeaborwa. 2013. Degradation of organic solar cells with solution processed ZnO. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July.
66. S.T.S. Dlamini, H.C. Swart and O.M. Ntwaeaborwa. 2013. The effects of substrate temperature on the structure, morphology and photoluminescence properties of pulsed laser deposited $Y_3(Al,Ga)_5O_{12}:Ce^{3+}$ nano thin films. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July.
67. P. Mokoena, H.C. Swart, I.M. Nagpure and O.M. Ntwaeaborwa. 2013. Luminescent properties of $Ca_5(PO_4)_3OH:Gd^{3+},Pr^{3+}$ phosphor Powder. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July. **Best MSc poster award – CCPMS semiconductors**
68. A, Yousif, O.M. Ntwaeaborwa and H.C. Swart. 2013. Effect of different annealing times on the structure of $Y_3(Al,Ga)_5O_{12}$:Tb thin film grown by PLD. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July.
69. M.A. Tshabalala, O.M. Ntwaeaborwa and H.C. Swart. 2013. Synthesis and Characterization of white light emitting $Sr_2SiO_4:Tb^{3+},Eu^{3+}$ phosphor. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 Julie.
70. S.V. Motloung, O.M. Ntwaeaborwa, F.B. Dejene and H.C. Swart. 2013. Effects of Cr3+ ions concentration in Cr-doped ZnAl2O4 nanocrystals synthesized using sol-gel process. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July.
71. Vinod. Kumar, H.C. Swart and O.M. Ntwaeaborwa, 2013. Synthesis of zinc oxide based nanophosphors by solution-combustion method. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July.
72. L.L. Noto, S. Pitale, O.M. Ntwaeaborwa, J.J. Terblans and H.C. Swart. 2013. Effects of different TiO2 phases on the luminescence of $CaTiO_3:Pr^{3+}$. The 58th Annual conference of the South African Institute of Physics, Richardsbay, South Africa. 8-12 July 2013.
73. R.L. Nyenge, H.C. Swart, O.M. Ntwaeaborwa, The influence of number of pulses and post annealing on the morphology and photoluminescence properties of Cas:Eu pulsed laser deposited thin films, 60th Conference of the South African Institute of Physics, 7-10 July. Port Elizabeth,

74. Motloung S.J. S.K.K. Shaat, K.G. Tshabalala, O.M. Ntwaeaborwa, Structural and photoluminescence properties of $LaV_{1-x}P_xO_4:Dy^{3+}$phosphor powder prepared by combustion method, 60th Conference of the South African Institute of Physics, 7-10 July. Port Elizabeth
75. Vinod Kumar, O.M. Ntwaeaborwa, H.C. Swart, The role of defects emission of undoped and doped ZnO thin films prepared by pulsed laser deposition, 60th Conference of the South African Institute of Physics, 7-10 July. Port Elizabeth
76. E Hasalbeldaim, O.M. Ntwaeaborwa, H.C. Swart, Effect of background gas and substrate temperature on ZnO:Zn thin films, 60th Conference of the South African Institute of Physics, 7-10 July. Port Elizabeth

**Seminars at local/International Institutions**

1. **OM Ntwaeaborwa,** Degradation of $Y_2O_3:Eu^{3+}$ powder phosphor, Physics Department: University of Kwazulu Natal Westville Campus) – Nov. 2003.

2. **OM Ntwaeaborwa,** Cathodoluminescence degradation of $Y_2O_3$:Eu power and thin film phosphors for application in field emission display, Department of Materials Science: University of Florida, Sept. 2004

3. **OM Ntwaeaborwa,** Measurement of radon and progeny concentration in an underground mining environment, National Nuclear Regulator, Centurion, March 2004.

4. **OM Ntwaeaborwa,** Degradation and energy transfer in phosphor materials for applications in electronic information displays: powders and thin films, Department of Physics: North West University (Mafikeng Campus), Oct 2005.

5. **OM Ntwaeaborwa**, Enhanced photoluminescence of $Ce^{3+}$ and $Eu^{3+}$ induced by an energy transfer from ZnO nanoparticles encapsulated in $SiO_2$ matrix, Physics department: University of Pennsylvania, Dec 2005

6. **OM Ntwaeaborwa,** Synthesis and Characterization of luminescent nanomaterials, Materials Research Group: Ithemba labs, June 2007

7. **OM Ntwaeaborwa**, Sol-gel synthesis and properties of nanoparticulate phosphors, National Centre for Nanostructured Materials: CSIR, Sept. 2007.

8. **OM Ntwaeaborwa**, Enhanced luminescence of rare-earth activators in sol-gel derived $SiO_2$ by energy transfer from ZnO nanoparticles and co-activators, Materials Physics Research Institute, University of the Witwatersrand, 17 March 2008.

9. **OM Ntwaeaborwa**, The chemistry and physics of luminescent nanomaterials, Department of Chemistry, North West University (Mafikeng Campus), March 2010.

10. PD Nsimama, **OM Ntwaeaborwa,** HC Swart, Auger electron/X-ray photoelectron spectroscopic and luminescent properties of SrAl2O4:Eu,Dy thin films, Materials Research Group, iThemba labs, 05 Aug 2010.

# APPENDIX E
# FUNDS RAISED:

| Programme | NRF/NLC/NNR | UFS/WITS | TOTAL |
|---|---|---|---|
| 1. Thuthuka- (NRF) | | | |
| 2004 | R 42,500.00 | R73,000.00 | R115,500.00 |
| 2005 | R 81,000.00 | 134,000.00 | R215,000.00 |
| 2006 | R83,000.00 | R98,000.00 | R181,000.00 |
| 2007 | R75,000.00 | R154,000.00 | R229,000.00 |
| 2008 | R154,000.00 | R108,000.00 | R262,000.00 |
| 2009 | R69,000.00 | R39,000.00 | R108,000.00 |
| 2010 | R154,000.00 | R154,000.00 | R308,000.00 |
| 2. SAIP conference Donation-(NNR) | | | |
| 2004 | R5,000.00 | - | R5,000.00 |
| 2. Knowledge Interchange - (NRF) | R41,310.00 | - | R41,310.00 |
| 2007 | R25,000.00 | - | R25,000.00 |
| 2012 | | | |
| 3. NNEP/NEP- (NRF)- | R1,341,990.90 | - | R1,341,990.90 |
| 2008 | R10,000,000.00 | - | R10,000,000.00 |

| | | | |
|---|---|---|---|
| 2013 | R1,566,971.00 | | R1,566,971.00 |
| 2018 | | | |
| 4. Rental Pool -(NLC/UFS) | | | |
| | R605,000.00 | R200,000.00 | |
| 2009 | R647,000.00 | | R805,000.00 |
| 2010 | R259,000.00 | | R647,000.00 |
| 2011 | R134,000.00 | | R259,000.00 |
| 2012 | R145,000.00 | | R134,000.00 |
| 2013 | R80,000.00 | | R145,000.00 |
| 2014 | R136,200.00 | - | R80,000.00 |
| 2015 | R145,000.00 | | R136,200.00 |
| 2016 | R80,000.00 | | R145,000.00 |
| 2017 | | | R80,000.00 |
| 5. International Collaboration | | | |
| (South Africa-Korea) - | R410,000.00 | | |
| (NRF) | R50,000.00 | | R410,000.00 |
| 2008-10 | R460,000.00 | - | R50,000.00 |
| 2011 | - | | R460,000.00 |
| 2015-16 | | | |
| 6. Cluster Funding – (UFS) | | R50,000.00 | R50,000.00 |
| 2009 | R100,000.00 | | R100,000.00 |
| 7. NSTF Award-(NRF) | R300,000.00 | | R300,000.00 |
| 8. Rated researcher (once off) - | | | |
| 2011 | R20,000.00 | R20,000.00 | R 40,000.00 |
| 9. Rated Researcher Incentive | R20,000.00 | R20,000.00 | R40,000.00 |
| 2009 | R20,000.00 | R20,000.00 | R40,000.00 |
| 2010 | R20,000.00 | R20,000.00 | R40,000.00 |
| 2011 | R20,000.00 | R20,000.00 | R40,000.00 |
| 2012 | R20,000.00 | R20,000.00 | R40,000.00 |
| 2013 | R40,000.00 | R40,000.00 | R80,000.00 |
| 2014 | | | |
| 2015 | | | |
| 10. Competitive rated | R294, 000.00 | | R294, 000.00 |
| researcher-NRF – | R160,00.00 | | R160,000.00 |
| 2012 | R306,000.00 | | R306,000.00 |
| 2013 | 356,000.00 | | R356,000.00 |
| 2014 | | | |
| 2015 | | | |
| **TOTAL** | **R15,683,000.9** | **R1, 170,000.00** | **R18,724,971.00** |

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|---|---|---|---|
| | | | |

**ACRONYMS**
NRF – National Research Foundation
NLC – National Laser Centre
NNR – National Nuclear Regulator
UFS – University of the Free State
NNEP – National Nanotechnology Equipment Programme
NSTF – National Science and Technology Forum