

African Materials Science and Engineering Network (AMSEN) Update for RISE Meeting Dar es Salaam, October 2012

L.A. Cornish (Director) and C. Sparkes (Head: Secretariat)



Nodes in AMSEN

DST/NRF Centre of Excellence in Strong Materials,
University of the Witwatersrand, South Africa
Prof. L.A. Cornish (Director)



University of Namibia, Namibia
Prof. F.P.L. Kavishe



University of Nairobi, Kenya
Prof. G.O. Rading (Deputy Director)

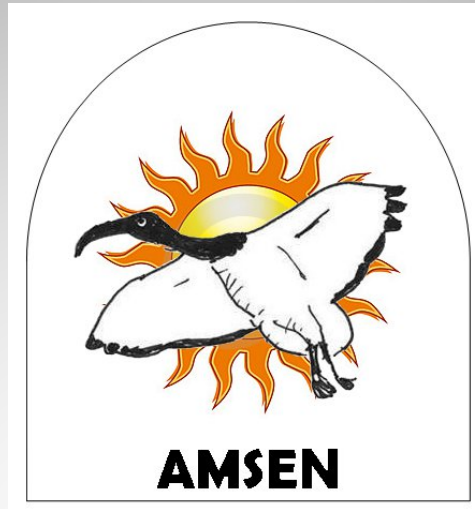


Federal University of Technology, Akure, Nigeria
Prof. J.O. Borode



University of Botswana, Botswana
Prof. P.K. Jain





AMSEN's Mission

- Become a base for African students to be trained, and for African researchers to collaborate
- Work on problems for Africa
- Train students for either an academic career, industry, or one which can influence government decisions
- Promote social responsibility for development

University of Botswana

- L. Chipise, MPhil submitted
- S.H. Coetzee, PhD PT, in progress, Faculty member
- N. Mokaloba, MPhil PT
- C.M. Muiva, PhD in draft
- G. Rabalone MPhil PT did not pass proposal

Federal University of Technology, Akure (FUTA)

- F.O. Aramide PhD, Faculty member
- D.O. Folorunso PhD , Faculty member
- I.O. Oladele PhD , Faculty member
- O.O. Olaniran PhD, obtained scholarship at TUT, RSA , Faculty member
- O.J. Dada MSc at Wits , Faculty member

University of Namibia

- G. Bathgate MSc Chem. Eng, graduated, working in industry
- L.M. Nyemba Lloyd MSc graduated, at OFS
- O.K. Ilunga MSc 3rd draft, working in industry
- G. Izaaks MSc at Wits – defaulted
- W.P. Nashidengo GDE- failed, Faculty member
- A.I. Mufula Alain PhD at Wits
- S. Hango PhD at Wits
- Ms Shifeta Naomi MSc

University of Nairobi

- E.A. Akhusama MSc graduated, joining Faculty & enroll for PhD
- C.O. Ayieko MSc Physics graduated, working in industry
- J. Mwero, PhD in draft
- K. Njoroge, PhD in progress
- P.M. Weramwenja, PhD in progress

Wits

- A.M. Apata, PhD 3rd draft, Faculty member at Department of Metallurgical & Materials Engineering, Federal Polytechnic, Idah, Kogi State, Nigeria
- B.O. Odera, PhD 3rd draft, Faculty member UoN
- Mrs O.A. Olaseinde, PhD 3rd draft,
- A.I. Popoola MSc banked, PhD 4th draft, Faculty member FUTA

UB: 1 MPhil did not pass proposal stage, 1 MPhil submitted, 2 PhD and 1 MPhil in progress

FUTA: 1 PhD went to TUT on scholarship, 3 PhD in progress, 1 MSc at Wits

UNAM: 2 MSc graduated from Wits, 1 GDE failed, 1 MSc lost, 2 MSc in progress – one at UNAM, 2 PhD in progress

UoN: 2 MSc graduated, 3 PhD in progress (+1?)

Wits: 1 MSc “banked”, 4 PhD in progress

Total 27 students have been in the system

4 left the system

4 MSc level graduated, 1 “banked”

1 MSc level submitted

3 MSc in progress

14 PhDs in progress

19 still in the system (+1 in UoN?)

Plans: fill half vacancies to give 2 students per node

Distribution of current students

UB: Zimbabwe, South Africa, Botswana, Kenya

FUTA: Nigeria (1 at Wits)

UNAM: Namibia, 2 DRC (South Africa, Zimbabwe)

UoN: Kenya

Wits: Nigeria, Kenya

Published journal papers: Total = 13

I.O. Oladele, J.A. Omotoyinbo and J.O.T. Adewara, Investigating the effect of chemical treatment on the constituents and tensile properties of sisal fibre, *Journal of Minerals and Materials Characterization and Engineering*, Vol. 9, No. 6 (2011) pp.569-582.

J.N. Mwero, S.O. Abuodha, S.W. Mumanya, G.O. Rading and F.P.L. Kavishe (Professor, UNAM), Sugarcane Waste Fibre Ash: Composition, Particle Size Distribution and Pozzolanic Properties, *ICASTOR Journal of Engineering*, Vol. 4, No. 2 (2011) pp. 137-144.

L. Nyemba, S. Iyuke and F.P.L. Kavishe, Reinforcement Effects of Carbon Nanoballs on Sulphonated Styrene Butadiene Rubber Ion Exchange Membrane, Accepted in April 2011 for publication in (journal of) *Applied Mechanics and Materials*, ISSN: 1660-9336

C.O. Ayieko, R.J. Musembi, S.M. Waita B.O. Aduda and P.K. Jain (Professor), Structural and optical characterisation of nitrogen doped TiO₂ thin films deposited by spray pyrolysis on fluorine doped tin oxide glass, *International Journal of Energy Engineering*, vol. 2, no. 3, (2011) pp. 67-72.
DOI:10.5923/j.ijee.20120203.02.

D.O. Folorunso, S. Aribo, P.A. Olubambi and J.O. Borode, Hydrometallurgical purification of some clay deposits for high temperature application, *Journal of Minerals and Materials Characterisation and Engineering*, vol.11, no.5, pp.461-469, 2012.

C.M. Muiva, S.T. Sathiaraj and J.M. Mwabora, Crystallisation kinetics, glass forming ability and thermal stability in glassy Se_{100-x}In_x chalcogenide alloys, *Journal of non-crystalline solids*, 357, (2011) 3726-3713

C.M. Muiva, S.T. Sathiaraj and J.M. Mwabora, Thermal and compositional defects in chemical spray pyrolysed indium selenide (In₂Se₃) thin films: Effects on film properties, *Journal of opto-electronics and advanced materials*. 13, (2011) 1240-1245

C.M. Muiva), S.T. Sathiaraj and K. Maabong), Effect of doping concentration of the Properties of aluminium doped zinc oxide films prepared by spray pyrolyses for transparent electrode application., *Ceramics International*, 37 , (2011) 555-560

K.D. Njoroge, S.M. Mutuli and J.M. Kihui, An intrinsic dislocation density – finite formulation of metal plasticity, *International Journal of Computational Engineering Research*, 2 (3), 843-850 (May-June 2012).

K.D. Njoroge, G.O. Rading, J.M. Kihui, M.J. Witcomb and L.A. Cornish, Dynamic analysis of dislocation cores in the α -Fe lattice using the embedded atom method: the Fe lattice, *International Journal of Computational Engineering Research*, 2 (3), 851-859 (May-June 2012).

B.O. Odera, L.A. Cornish, M.B. Shongwe, G.O. Rading and J.M. Papo, As-Cast and Heat Treated Alloys of the Pt-Al-V System at the Pt-Rich Corner, *J. South African Institute of Mining and Metallurgy*, 7A (July 2012) 505-515.

O.A. Olaseinde, J.W. van der Merwe, L.A. Cornish and P.A. Olubambi, Electrochemical studies of Fe-21Cr-1Ni duplex stainless steels with 0.15wt% ruthenium at different temperatures, *J. South African Institute of Mining and Metallurgy*, 7A (July 2012) 535-538.

B.O. Odera and L.A. Cornish, Electrolytic etching of platinum-aluminium based alloys, *Platinum Metals Review*, 56 (4) (Oct 2012) 257-261.

Equipment 2012

– partial funding

- Low Speed Diamond Wheel Saw at UNAM
- + Wits getting more microscopes... (Non AMSEN funding)

Workshops

- Mrs Adenike Olaseinde (Wits): CorriSA corrosion course at the end of October.
- AMSEN students at the Africa Materials Research Society had the the chance to attend various workshops at the conference in Victoria Falls, Zimbabwe, December 2012.
- **2nd AMSEN Workshop in Nairobi, March 2012**
- Nearby new students attended an X-Ray Diffraction Workshop run at Wits.
- **Plans to hold another X-Ray Diffraction Workshop in Nigeria, are stumbling – lecturer has links in Nairobi with Bruker and wants to do it there!**
- **Concentrating more on the students completing...**
- Access to specialised equipment, e.g. the SEM at UB, TEM and XRD at Wits, and through Wits, SEM at NMISA, Pretoria.
- S. Hango (UNAM) attended a CorriSA corrosion course at the end of October.

Visits

- Prof, L.A. Cornish had a three-day visit to the U.B. to work with S.H. Coetzee and L. Chipese, October 2011.
- O.K. Ilunga (UNAM) used an SEM at the National Metrology Institute of South Africa (NMISA) , Pretoria, November 2011.
- A.I. Popoola presented at the Condensed Matter and Materials Physics Conference, Manchester, UK, December 2011.
- B.O. Odera was part of the Materials Science International Services Seminar, Schloss Ringberg, Tegernsee, Germany, and GmbH, Stuttgart and also visited Bayreuth University, February 2012.
- Profs. Cornish and Kavishe, and S. Hango (UNAM, Wits) visited Otjihase Mine, near Windhoek, Namibia to obtain information for his PhD project.
- O.J. Dada visited Nelson Mandela Metropolitan University, Port Elizabeth, May 2012.
- Odilon Ilunga visited Wits for three days to work on his draft MSc, and it is hoped that an extended abstract will be submitted to MSSA, August 2012.
- O.J. (FUTA, at Wits) presented his work at the IASSA Conference, Johannesburg, September 2012, as well as to an American Airforce delegation. Possible interest in AMSEN?

Other visits

- Prof. Rading attended the Association of International Education Administrators (AIEA) Conference, Washington DC, February 2012.
- Prof. Rading attended a conference at the African Academy of Sciences in Nairobi this May, held by the PRISM project (Procurement, Installation, Service, Maintenance and Use of Scientific Equipment), March 2012.
- Prof P.K. Jain presented a paper "Combating energy poverty in Africa: Addressing barriers to off-grid rural electrification " at the World Renewable Energy Forum - 2012 (WREF-2012), at Denver, Colorado, USA, May 2012.
- Prof P.K. Jain gave a seminar "Materials research at the University of Botswana: Phases in Ni based ternary alloys" at the Department of Physics, University of Connecticut, Storrs, CT, USA, May 2012.
- Prof. George Rading attended and presented at the IFS/AAS Conference on "Getting and Using Equipment for Scientific Research in Africa", June 2012.

Inter-RISE collaboration

- Prof. Jane Morris of SABINA was appointed to jointly supervise an AMSEN student from FUTA Node with particular reference to handle the biological aspect of the student's PhD research studies, but the contact was difficult...

Other resources

- AMSEN benefits from being part of the DST/NRF Centre of Excellence (CoE-SM) because much of the Secretariat work is done by the CoE-SM, and the Secretariat is larger than AMSEN could afford
- AMSEN students benefit from being part of a larger organization as well, with a Student Day, social event and invitations to joint scientific presentations of the Materials Physics Research Initiative (MPRI) / CoE-SM
- Advanced Metals Initiative (AMI) is very beneficial for two of the Wits students providing access to equipment and loan of the expensive raw materials
- Through CoE-SM, benefits the third Wits student providing access to the arc-melting furnace and attending a course
- UNAM has funding from the Fulbright Foundation: allowed Fulbright Scholar, Ms Anne Lambert, to spend 9 months from September 2011: research on the recycling of waste to produce biogas for domestic use
- Research is mainly funded by Fulbright, but some RISE funds (UNAM Node) will be used to cover local expenses for the Namibian co-researchers

Nice try, BUT

- INTRA-ACP Academic Mobility Scheme:
EACEA/ 35 /10
- Education, Audiovisual and Culture Executive Agency (EACEA), European Union, Brussels
- € 93,250
- Unsuccessful in 2011, as not all nodes could respond: correct form was only available very late!
- Also unsuccessful in 2012.

Other applications

- National Council for Science and technology (NCST), US\$ 11 500, Science, Technology and Innovation Grant 2011/2012 (Support for Conferences)
- Wits University Research Council, US\$ 78 000, Funding for EBSD detector for SEM – successful (not that the SEMs work....)
- Joint bid for a 300kV TEM at Wits – successful

Requests to join AMSEN

- Several institutions, on hearing about AMSEN, either through exposure at conferences, or through the Africa Materials Research Society, have requested to join AMSEN
- Obviously, these cannot be accommodated until more funding is acquired
 - University of Zambia
 - University of Zimbabwe
 - University of Addis Ababa, Ethiopia
 - University of Ilorin, Nigeria

Problems!

- Lack of collegiality have lead or could lead to lateness in up to two students submitting
- “Stagnant” feeling that we do not know where we are going.

Future plans

- Graduate those students!
- Mini-sabbatical if needed for graduated students
- Publish good papers
- Useful to society?
- Find more funding
 - RISE?
 - External?
- Fill half the vacancies

A very special thanks to the Carnegie-IAS
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the Science Initiative Group (SIG) for giving us
the opportunity to build the Network

