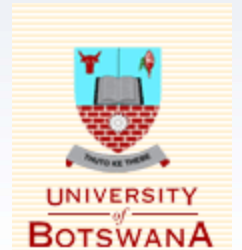
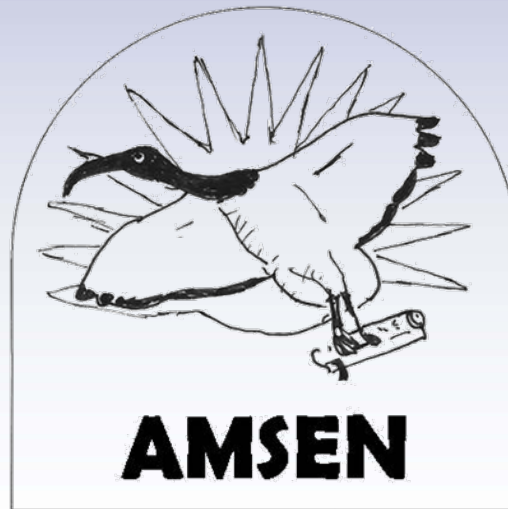


# African Materials Science and Engineering Network (AMSEN) Progress: September 2009

L.A. Cornish and T. Capecchi



# Nodes in AMSEN

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



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



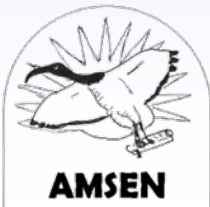
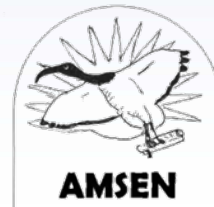
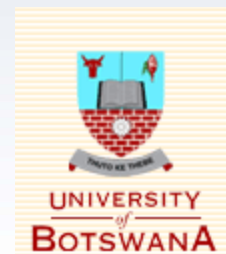
University of Namibia, Namibia  
Prof. F.P.L. Kavishe (Head of Secretariat)



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



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



# Aims

- Research
- Training + mentoring (co-supervise students with more experienced staff within the Nodes)
- Build capacity
- Exploit the respective strengths of individual partner institutions for the collective benefit to build capacity
- Encourage Intra-Africa cooperation among the five Universities and encourage sharing of both manpower and equipment
- Widen the exposure of the selected students via multiple supervision and regular travel within the Nodes

# Key Performance Areas

1. Research
2. Education & Training
3. Networking

# Research Plan

- Build strong Research Teams
- Assess the expertise and experience in the network
- Identify overall research areas + members
- Set up individual projects
- Members complement each other
- Opportunity to bring less experienced members into the supervisory teams → they can be mentored while undertaking research.
- Where possible, use post doctorate fellows to undertake research + help students + mentor
- Fundamental research will be supported + encourage industrial participation, both for additional funding, but also to ensure relevant projects for the students. A good balance will be attempted between fundamental and applied research.

# PhD Training

- Students registered with one major supervisor (Uni rules!)
- E-mail + visits
- At least 3 reports annually: end May, September and December
- Conferences:  
Discipline specific +
  - \* African Materials Research Society (AMRS) **Bi-annually**  
(Nigeria, Dec 2009)
  - \* Microscopy Society of Southern Africa (MSSA) **Annually**
  - \* South African Institute of Physics (SAIP) **Annually**
- AMSEN Meeting alternately with AMRS: Namibia, Jan 2010
- Periodic workshops to be attached to AMRS and AMSEN

# Networking

- Visits
- Collaborations – build on each other's
- Web page – build and each node will have a link – **CoE-SM, Wits currently building**

# Communication Plans

- Mostly e-mails
- Visits within Research Teams
- Annual Report: inputs and outputs, progress...
- Short reports from the students
- Publications in journals will be strongly encouraged, as well as making presentations at conferences



# Contribution by All Nodes

- Recognized that some institutions have more facilities and expertise than others
- AMSEN will not be allowed to become one-sided
- Guarantee contributions from all nodes by ensuring that the personnel are part of at least some of the research teams
- Where limited expertise, researcher will be mentored.
- Access to equipment not at the home university by visits.
- Recommended, where possible, make applications for travel grants to visit institutions with the necessary equipment.
- All nodes will be encouraged to have active contacts with relevant local industries; will help the less experienced nodes to contribute to the AMSEN network.

# Academic Retention Strategy

Note poor remuneration!

Possible remedies:

- **Scheme for supplementation** + from industry
- Allow staff to be seconded to industry for short periods of time
- Allow staff to undertake consulting work
- **Reward researchers for papers published and students graduated**
- Give academic staff sufficient time to undertake research
- **Support to go to conferences and undertake academic visits**
- **Funds: equipment, visits and training of the academics involved**
- **Exposure to other workers...**

# Progress to date!

- 18 students on board, one more identified
- At least 20 faculty members nominated
- Projects already started
- At least 4 conference abstracts submitted

<b>Research Team</b>	<b>Research Team Members</b>	<b>AMSEN Node</b>	<b>Research Team</b>	<b>Research Team Members</b>	<b>AMSEN Node</b>
<b>Corrosion</b>	Prof. F. Kavishe	U Nam	<b>Composites Research</b>	Dr J.A. Omotovinbo	FUTA
	Mr J. Van der Merwe	Wits		Dr K.K. Alaneme	FUTA
	Dr Peter Olubambi	FUTA		Prof. R Paskaramoorthy	Wits
	Prof. L.A. Cornish	Wits		Prof. G.O. Rading	U Nairobi
<b>Alloy Development</b>	Prof. G.O. Rading	U Nairobi		Prof. F. Kavishe	U Nam
	Prof. L.A. Cornish	Wits	<b>Ceramics</b>	Prof. I. Sigalas	Wits
	Dr N. Sacks	Wits		Prof. J.O. Borode	FUTA
	Prof. F. Kavishe	U Nam		Dr J.O.T. Adewara	FUTA
	Prof. J.O. Borode	FUTA		Dr. P.A. Olubambi	FUTA
	Dr B.O. Adewuvi	FUTA		Dr B.O. Adewuvi	FUTA
<b>Phase Diagram Research</b>	Prof. L.A. Cornish	Wits		Prof. P.K. Jain	U Botswana
	Prof. P.K. Jain	U Botswana	<b>Polymers</b>	Dr V. Ochieng	U Nairobi
	Prof. M.J. Witcomb	Wits		Prof. G.O. Rading	U Nairobi
	Mr. S.H. Coetzee	U Botswana		Prof. F. Kavishe	U Nam
<b>Nanotechnology</b>	Prof. S. Iyuke	Wits	<b>Concrete</b>	Dr. S. Ekolu	Wits
	Prof. F. Kavishe	U Nam		Prof. F. Kavishe	U Nam
	Prof. J.O. Borode	FUTA		Prof. G.O. Rading	U Nairobi
	Dr B.O. Adewuvi	FUTA			

# Visits

- Usually try and arrange with other occurrences to save money!
- Visits from RISE
- Visits from other nodes
- Visits to industry

<b>Date</b>	<b>Instigator</b>	<b>Person or place visited</b>	<b>Purpose of meeting / visit</b>
13th August 2008	Prof. F Kavishe	Prof. L.A. Cornish, University of the Witwatersrand	Planning for AMSEN
4 <sup>th</sup> – 5 <sup>th</sup> September - 2008	Prof. F. Kavishe	Prof. L.A. Cornish, University of the Witwatersrand	Planning for AMSEN, and to meet AMSEN colleagues at Wits
17 <sup>th</sup> September 2008	Prof. L.A. Cornish	Prof. P.K. Jain and Mr S. Coetzee, University of Botswana	LAC presented the AMSEN rationale; further plans for AMSEN
6 <sup>th</sup> – 7 <sup>th</sup> October 2008	Profs. L.A. Cornish and F. Kavishe, Dr T. Capecchi	RISE meeting, Nairobi	Meet the other networks & RISE, define the projects
8 <sup>th</sup> October 2008	Profs. L.A. Cornish and F. Kavishe, Dr T. Capecchi	Prof. G.O. Rading, University of Nairobi	AMSEN planning, meeting students
28 <sup>th</sup> November 2008	Prof. P.K. Jain	UNam	AMSEN planning
4th December 2008	Prof Mogus D Mochena, Professor of Physics, Director, Center for Nanoscience and Nanotechnology, Florida A & M University, Tallahassee, Florida 32307, USA	Prof. S. Iyuke, University of the Witwatersrand	Give a presentation and explore the possibility of collaborating on carbon nanotube between a US group (his group and Prof. Stefano Curtarolo from Duke University)
11 <sup>th</sup> – 15 <sup>th</sup> May 2009	Prof. F. Kavishe	Dr. T. Capecchi, Prof. S. Iyuke, University of the Witwatersrand, and students being co-supervised by him	Discuss projects and their progress
June 2009	Dr. P. Olubambi	Meeting with the student being co-supervised by him, Discussions with Prof. L.A. Cornish	Discuss the project FUTA budget, students and visit
June 2009	Mr O. Ilunga, Profs. L.A. Cornish and F. Kavishe	Zambian copper refiner	Learn about the processes, and make contact

# Progress from Wits

<b>Starting date</b>	<b>Candidate Name</b>	<b>Proposed Research Title</b>	<b>Progress</b>
Jan 2009	Adenike O. Olsiende	Ruthenium additions to the LDX duplex stainless steels	Courses; Exptl. work started + working with post doc on Thermo-Calc; presented at AMI Seminar; abstract sent off to AMRS
Jan 2009	Ayodeja Apata	Study of the V-Ni-C system	Courses; Exptl. work started + working with post doc on Thermo-Calc; abstract sent off to MSSA
Jan 2009	Bernard Odera	The addition of niobium and vanadium to Pt-based superalloys	Courses; Exptl. work started; presented at AMI Seminar; abstract sent off to MSSA
Aug 2009	Adewumi Isaac Popoola	TBA: in computational modelling	Just arrived!

# **Courses/workshops attended by AMSEN students at Wits:**

- E- Resources for Engineering Workshop, 25<sup>th</sup> March, 2009
- Abstract writing 6<sup>th</sup> May 2009
- Writing a Technical Report for Engineers, 12<sup>th</sup> March 2009
- Project Proposal, 9<sup>th</sup> March 2009
- Supervision Practices and Entitlements, 18<sup>th</sup> March, 2009
- Atomic Force Microscopy, 25<sup>th</sup> - 26<sup>th</sup> March 2009



# Progress from U. Nairobi

<b>Starting date</b>	<b>Candidate Name</b>	<b>Proposed Research Title</b>	<b>Progress</b>
-	Ms Marina L. Mukabi, Kenya	Development of Electrically conducting polymers	Declined due to problems
1 <sup>st</sup> April 2009	John N. Mwero, Kenya	An Investigation of Sugar Cane Waste Ash as a Cementing Material	Started preliminary experiments
July 2010	Eliakim Niva, Kenya	?	Undertaking necessary course work
Nairobi	Dickson K. Njoroge, Kenya	Proposed: finite element formulation of the behaviour of dislocations in metallic alloys	Working on proposal

# Progress from U. Namibia

<b>Starting date</b>	<b>Candidate Name</b>	<b>Research Title</b>	<b>Progress</b>
January 2009	Lloyd Nyemba	Reinforcement of Synthetic Rubber with Carbon Nanoballs to produce Nano-composite Ion Exchange Membrane	Started exptl. work
January 2009	Odilon Ilunga	Thermo-mechanical behaviour of electro-refined blister copper from the Tsumeb Smelter in Namibia	Started, problems with mines not running fully; visited Zambia
January 2009	Graham Bathgate	Continuous production of single-walled carbon nanotubes using swirled floating catalytic chemical vapour deposition	Started exptl. work
January 2010	Willem P. Nashidengo	Study of corrosion along the Namibian coast	....

# Progress from FUTA

Starting date	Candidate's Name	Proposed Research Title	Progress
By April 2009	D.O. Folorunso	Sol-gel processing and characterization of naturally-occurring clay materials for refractory application	The candidates have presented their research proposal seminars. With AMSEN funds, they are about sourcing for materials for their research work especially preliminary processing of the raw materials.
By April 2009	F.O. Aramide	Development of alkaline niobate electroceramic from kaolinitic clay materials	
By April 2009	O.O. Olaniran	Development and characterization of nano-structured austempered ductile iron	
By April 2009	I.O. Oladele	Production and evaluation of the mechanical properties of natural fibre reinforced composites	

# Progress from U. Botswana

Starting date	Candidate's Name	Proposed Research Title	Progress
August 2009	Stephan H. Coetzee	Constitution of the Ni-Ru-V System	Registered; proposal done; procured furnace and materials; working on journal publication from MPhil & MMSA abstract submitted
August 2009	Cosmos Muiva	Structure and electrical properties of amorphous Se-In-Si films	Registered; started work
August 2009	Gaobakwe Rabalone	An investigation of indigenous clays of Botswana and their influence on the quality of clay products manufactured in Botswana	Registered, proposal in progress
August 2009	Liberty Chipise	A study of the Ni-Ru-Zr System	Registered, proposal in progress

Bursary Grant Committee and  
AMSEN Interest Group have been established

# Proposed reward scheme

Research output	Research Unit Value (RUV)	Rationale and limit
MSc student in the system	0.5 for Home Supervisor(s) 0.13 for other Supervisor(s)	Up to a limit of 2.5 years
PhD student in the system	1 for Home Supervisor(s) 0.25 for other Supervisor(s)	Up to a limit of 5 years
MSc student graduating	1 for Home Supervisor(s) 0.25 for other Supervisor(s)	Up to a limit of 2.5 years
PhD student graduating	1 for Home Supervisor(s) 0.5 for other Supervisor(s)	Up to a limit of 5 years
Conference paper: abstract at a local conference	0.25	Up to two papers at the same conference
Conference paper: abstract at an international conference, or full paper at a local conference	0.5	Up to two papers at the same conference
Journal paper accepted	1.0	

# Student conferences

- 2 students presented at Advanced Metals Initiative in July 2009
- 3 students have submitted abstracts for Microscopy Society in Southern Africa Conference, Durban, December 2009
- 1 student has submitted an abstract to the African Materials Research Society, Abuja, Nigeria, December 2009
- AMSEN Workshop planned for January 2010

# Networking Meetings

- RISE meetings, Nairobi, September 2008 and September 2009
- “Africa Networking Meeting”, Stellenbosch, October 2008
- Regional and Interregional Cooperation to Strengthen Basic Sciences in Developing Countries Conference, 1<sup>st</sup>-4<sup>th</sup> September 2009, Addis Ababa, Ethiopia
- TWAS, Durban, South Africa, October 2009

# Problems

- Communication is very difficult at times, especially with Nigeria
- Infrastructure not always good
- Problems with transferring money
- Difficulty in finding administrative staff
- U. Botswana had difficulty in finding students
- University rules!
- Sometimes takes a long time to get the students into the programme!



# The future

- Interest from Zambia and Ethiopia
- Increased funding for more liaison: TWAS and SIDA
- Work with USA universities on course development

**Thank you!**

A special thanks to the Carnegie-IAS Regional Initiative in Science and Education for giving us the opportunity to build the Network