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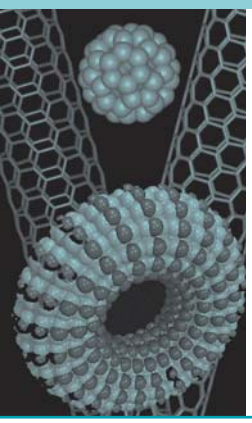

Keeping pace with the military applications of nano and micro systems is vital if a technological edge is to be maintained in national defence

SMi's Inaugural Conference on...

Nano & Micro Systems in Defence

30th & 31st October 2006, Central London

Gain insight from leading experts in the field, including:

- **Professor Dr Roland Decuypere,** Visiting Professor, **ERASMUS Institute, Brussels** and retired Head of Department, IWT, **Royal Military Academy, Belgium**
- **Professor Dr Lukas Rohr,** Head of Materials Technology, **EMPA Thun, Switzerland**
- **Dr Douglas Imeson,** Technical Adviser, Nanotechnology, **dstl**
- **Dr Rafal W Zbikowski,** Principal Research Officer, Department of Aerospace, Power and Sensors, **Cranfield University (Defence Academy Shrivenham)**
- **Dr Jörg Schulze,** Senior Consultant, Production Processes, Simulation and Risk Management Department, **Siemens** and Faculty Member, **University of the German Armed Forces**
- **Dr Carl Picconatto,** Lead Scientist, Nanosystems Group, **MITRE Corporation**
- **Dr Steven Savage,** Deputy Research Director, Functional Material, **Swedish Research Agency (FOI)**
- **Giulio Prisco,** Director, **FutureTAG and Institute for Ethics and Emerging Technologies, Spain**
- **Philippe Van Nedervelde,** Executive Director, Europe, **Foresight Nanotech Institute**
- **David W Panhorst,** Project Officer, Common Guidance Program, **US Army ARDEC**

Chaired by:

- **Professor Dr Ignaz Eisele,** Electrical Engineering and Information Technology, **University of the German Armed Forces**

Benefits of attending:

- **EXPAND** your knowledge of ongoing nano and micro military research programmes
- **IDENTIFY** the key defence areas nano and microtechnolgies will impact upon
- **ASSESS** current and proposed tri-service research initiatives
- **MAXIMISE** your organisation's ability to keep pace with the approaching defence revolution
- **NETWORK** and connect with military, academic and industry leaders who are shaping the future of military technologies

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GROUP AND ACADEMIC DISCOUNT AVAILABLE

Day One 30th October 2006

8.30 Registration & Coffee

9.00 **Chairman's Opening Remarks**
Professor Dr Ignaz Eisele, Electrical Engineering and Information Technology, **University of the German Armed Forces**

CAPABILITY AND ADVANCEMENTS OF NANO & MICROSYSTEMS

THE CAPABILITY OF NANO & MICRO DEFENCE APPLICATIONS

9.10 **Implementing Nanotechnology**
- The opportunities
- Developments: communication and information systems
- Developments: sensors and electromagnetic manipulation
- Developments: platforms, power, protection
- Challenges to implementation of micro & nano systems in defence

Dr Douglas Imeson, Technical Adviser, Nanotechnology, **dstl**

THE MNT DEVELOPMENT ROADMAP FOR DEFENCE APPLICATIONS

9.50 **Delivering the potential of micro and nano technologies**
- Multi-parameter sensing
- Multi-functional performance
- Multi-disciplinary properties
- Agility and reconfigurability
- Stealth, ambient intelligence and persistent surveillance
- Embedded and distributed processing

Dr Ayman El-Fatatry, Customer and Business Development Manager, The System Engineering Innovation Centre (SEIC), **BAE SYSTEMS**

10.30 Morning Coffee

FORCE PROTECTION

11.00 **Enhanced survivability through materials technology**
- Signature management - avoid detection
- Ballistic protection - bullets blast & trauma
- Laser protection - avoid eye injury
- Health - avoid infection

Dr Steven Savage, Deputy Research Director, Functional Material, **Swedish Research Agency (FOI)**

PATENTING MICROSYSTEMS AND NANOTECHNOLOGY

11.40 **Technology in defence contracting - structures and protection**
- Evolution of defence procurement contracting structures - increasing role of technology
- Defence Industrial Strategy - sovereignty and national security
- Protecting IPR - corporate strategy - patent system
- IPR in different types of contracting - DEFCONS / OGC / PPP
- Security issues

Paul Briggs, Partner, Aviation and Aerospace, **Bird & Bird**

12.20 Networking Lunch

AUTONOMOUS SYSTEMS

INSECT-LIKE FLAPPING WING MICRO AIR VEHICLES

1.50 **Reconnoitring in confined spaces**
- What are MAV?
- Why develop MAV?
- Technological challenges
- Future plans

Dr Rafal W Zbikowski, Principal Research Officer, Department of Aerospace, Power and Sensors, **Cranfield University (Defence Acadamy Shrivenham)**

MICRO FLYERS – A LONG WAY TO GO?

2.30 **Challenges and solutions**
- Aerodynamic challenges
- Lift and propulsion
- Stability & control
- Avionics, sensors and communication

Professor Dr Roland Decuypere, Visiting Professor, **ERASMUS Institute, Brussels** and retired Head of Department, IWT, **Royal Military Academy, Belgium**

3.10 Afternoon Tea

FROM MEMS TO ANGELNETS

3.40 **A visionary roadmap**
- Current smart dust applications and short-term developments
- Nanoscale smart dusts
- The concept of utility fog
- Future scenarios: beyond the wildest dreams
- SF scenario: Angelnets on Orion's Arm

Giulio Prisco, Director, **FutureTAG and Institute for Ethics and Emerging Technologies, Spain**

MAPPS - MULTI-LATERALLY ASSURED PERVASIVE PERMANENT SUR-/SOUS-VEILLANCE

4.20 **NEMS-based SMART DUST Localizer & Sensor Network Systems**
- Smart Dust systems – origins & state of the art
- Exponentially increasing Asymmetric Destructive Capabilities (ADC)
- A new geopolitical security doctrine concept: MAPPS.
- Radical reciprocal geostrategic accountability & geotactical transparency for maximized security through pervasive, permanent military intelligence gathering
- Towards extremely fine-grained prevention and control of armed conflicts & terrorism

Philippe Van Nedervelde, Executive Director, Europe, **Foresight Nanotech Institute**

APPLICATIONS OF NANOELECTRONIC COMPUTER SYSTEMS

5.00 **Nanomemories, nanoprocessors, and ultra-small, special-purpose nanoelectronic systems**
- How nanocomputers are likley to work
- Design and simulation of circuit and system components of nanocomputer systems
- Applications for command and control
- Inspiration for nanosensing systems
- Novel uses for communications

Dr Carl Picconatto, Lead Scientist, Nanosystems Group, **MITRE Corporation**

5.40 **Chairman's Closing Remarks and Close of Day One**

Day Two 31st October 2006

8.30 Re-registration & Coffee

9.00 **Chairman's Opening Remarks**
Professor Dr Ignaz Eisele, Electrical Engineering and Information Technology, **University of the German Armed Forces**

MICRO ELECTRO MECHANICAL SYSTEMS IN DEFENCE

MEMS IN DEFENCE
9.10 **Applications, industry chain and markets**
- Overview of MEMS products and applications for defence and security
- Revenues and key players
- Case study inertial sensors
- Case study RF MEMS

Jérémie Bouchard, Director, Market Research, MEMS, **Wicht Technologie Consulting**

MICRO ELECTRO-MECHANICAL SYSTEMS (MEMS) FOR INERTIAL MEASUREMENT UNITS (IMU)
9.50 **Common Guidance Program**
- Common guidance device for missiles and munitions
- Low cost device achieved by economies of scale
- MEMS delivers accuracy of Ring-Laser and Fiber Optic Gyro capable of surviving 20000 g gun launch
- Combination of the IMU with GPS provides even better performance
- This device will meet 90% of tactical weapons

David W Panhorst, Project Officer, Common Guidance Program, **US Army ARDEC**

10.30 Morning Coffee

NANO DEFENCE MATERIAL FOR FUTURE SOLDIER TECHNOLOGY

NANOPHOTONIC METAMATERIALS
11.00 **Elemental base of the next photonic revolution**
- Achieving new optical functionality by nanostructuring
  - from photonic crystal to nanostructures surfaces
- Optical negative index materials
  - towards optical instruments of unprecedented resolution Plasmons
  - new information carrier in metal nanostructures
- Controlling signals on the nanoscale
  - towards the new level of photonic integration
- Numbering micro-objects - a billion of different nanophotonic tags

Professor Nikolay Zheludev, Professor of Physics, Coordinator, EPSRC NanoPhotonics Portfolio Centre, School of Physics and Astronomy, **University of Southampton**

PHOTONIC CYSTALS FOR SURFACE ENHANCED RAMAN SCATTERING (SERS) SENSING
11.40 **Breaking the bounds of trace level detection of molecules**
- First "engineered" approach to SERS detection
- Metalic "nano-structures" used to obtain characteristic optical signatures of complex molecules
- Greatly enhanced sensitivity and test to test repeatability through surface plasmon engineering
- Exploration of emerging applications in: medical diagnostics, forensic detection, pharmaceuticals, homeland Security
- Showcase example: trace level detection of illicit drugs and metabolites

Dr Martin Charlton, Co-Founder and Senior Research Manager, Research and Development, **MesoPhotonics**

12.20 Networking Lunch

MICRO/NANOFACTORY IN THE SEM
1.50 **Nanomechanics and Nanotooling**
- Instruments for SEM's
- Mechanics of nanowires
- Manipulation of nanotubes
- Industrial applications

Professor Dr Lukas Rohr, Head of Materials Technology, **EMPA Thun, Switzerland**

PLASMA ENHANCEMENT OF MILITARY CLOTHING
2.30 **Concept and achievements**
- Liquid repellency for military clothing
- Introduction to plasma processing
- Features of plasma technology
- Applications for wider material processing

Dr Stephen Coulson, Technical Director, **P2i**

3.10 Afternoon Tea

QUANTUM CRYPTOGRAPHY AND TECHNOLOGIES

QUANTUM CRYPTOGRAPHY IN EUROPE
3.40 **Current status & future developments**
- Basic protocols
- Basic implementations
- European players
- Fiber-based and free space systems
- Beyond quantum key distribution

Stefan De Haan, Senior Consultant, Quantum Cryptography, **Wicht Technologies Consulting**

QUANTUM CRYPTOGRAPHY
4.20 **Free space systems in a quantum network for secure communications**
- Secure key distribution
- Key management
- Quantum key distribution
- Quantum technologies for free space
- Quantum network

Dr Brian Lowans, Teamleader, Quantum Cryptography, **QinetiQ**

IS THERE A WAY TO BUILD A QUANTUM PC?
5.00 **A technology driven perspective**
- Principles of quantum computation: Q-Bits, Multi-Q-Bits, gates, and entanglement
- The first experimental realisation of a quantum computer and Shor´s algorithm
- Approaches to build Q-Bits, ways of Q-Bit manipulation, and the programming and readout problem
- Silicon-based technology:
- Stochastic emulation of quantum algorithms on classical computer architectures

Dr Jörg Schulze, Senior Consultant, Production Processes, Simulation and Risk Management Department, **Siemens** and Faculty Member, **University of the German Armed Forces**

5.40 **Chairman's Closing Remarks and Close of Conference**

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NANO & MICRO SYSTEMS IN DEFENCE

30th & 31st October 2006, Central London

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