



LECTURE SERIES AVT-129b

on "Nanotechnology Aerospace Applications - 2006"

sur " Les applications aérospaciales des nanotechnologies -2006 "

organized by the

Applied Vehicle Technology Panel

to be held in

USA, Seattle on 16 – 17 October 2006

CANADA, Montreal on 19 – 20 October 2006

SLOVENIA, Ljubljana on 6 – 7 November 2006

FRANCE, Bordeaux on 9 – 10 November 2006

This Lecture Series is open to citizens from both NATO and Partnership-for-Peace (PfP) Nations.

Latest Enrolment Date

NATO Nations **Monday, 9 October 2006**

PfP Nations **Monday, 2 October 2006**

Enrol on-line at <http://www.rta.nato.int/meetings.asp>

If you are unable to enrol via the internet, please use the attached enrolment form to enrol via fax.

Simultaneous interpretation into French will only be provided in **Bordeaux, France**. All other presentations and discussions will be held in **English**.

Background

The mission of RTO is to conduct and promote co-operative research and information exchange. RTO consists of a three level organization: the Research and Technology Board (RTB), the Panels and the Technical Teams. The Applied Vehicle Technology Panel (AVT) is one of the seven Panels under the RTB.

The mission of the Applied Vehicle Technology Panel is to improve the performance, affordability and safety of vehicle platforms, propulsion and power systems through the advancement of appropriate technologies. The panel addresses technology issues related to vehicle platforms, propulsion and power systems operating in all environments, including land, sea, air and space, for both new and aging systems.

Theme

Nanotechnology, which deals with the creation of materials, devices and systems in the nanometer scale (1-100 nm) through manipulating matter at that scale and exploiting novel properties arising because of the nanoscale, will have an impact on numerous commercial, defense, and space applications. The lectures will provide a general introduction with selected examples into this novel and emerging technology, including nanomaterials synthesis and characterization, nanofabrication, applications, and commercialisation.

The fabrication will be classified into top down nanotechnology utilizing high-end lithography and similar technologies, bottom up technologies building up the products at the atom level, and nanoparticle & nanotube production. An additional classification will be discussed on the basis of the enabling properties derived from the final products and novel properties not found in bulk or micro sized particles. Characterization techniques will be presented for measuring nanoparticles and nanotechnology-based products for all geometric aspects and functional characteristics.

The discussions on nanotechnology applications will include electronics, computing and data storage, sensors and instrumentation, energy, health and medicine, life style sectors and defense. The focus will be on new and enhanced capabilities in all of the above sectors and the impact on the society. Examples of specific aerospace applications include high strength & low weight composites, improved electronics and displays with low power consumption, variety of physical sensors, multifunctional materials with embedded sensors, and other examples of what the aerospace industry can expect from the field of nanotechnology. Also potential energetics & power applications will be discussed.

MEMS/nanotechnology integration will be addressed as a potential to improve MEMS devices through nanotechnology and to utilize MEMS to explore nanoscale systems. Finally, a forecast of short term to long term prospects for potential applications will be discussed, including the challenges currently being faced to commercialize nanotechnology and the efforts across the world.

Thème

La nanotechnologie, qui concerne la fabrication de matériaux, d'appareils et de systèmes à l'échelle du nanomètre (1-100 nm) grâce à la manipulation de matière à cette échelle et à l'exploitation des nouvelles propriétés découlant de l'échelle nanométrique, aura un impact sur nombre d'applications commerciales, spatiales, et de défense. Les conférences offriront, avec des exemples choisis, une introduction générale à cette nouvelle technologie émergente, comprenant la synthèse et la caractérisation des nanomatériaux, la nano fabrication, les applications et la commercialisation.

La fabrication sera classée en nanotechnologie à approche descendante, utilisant la lithographie de pointe et autres technologies similaires, en technologies à approche ascendante, qui assemblent les produits au niveau de l'atome, et en production de nano particules et de nano tubes. Une classification supplémentaire sera envisagée, sur la base des propriétés facilitantes dérivées des produits finaux et des nouvelles propriétés qui n'existent pas dans les grosses particules ou les microparticules. Des techniques de caractérisation seront présentées, pour la mesure des nano particules et des produits basés sur la nanotechnologie, concernant tous les aspects géométriques et les caractéristiques fonctionnelles.

Les tables rondes sur les applications de la nanotechnologie traiteront des domaines de l'électronique, de l'informatique et du stockage des données, des capteurs et de l'appareillage de contrôle, de l'énergie, de la santé et de la médecine, des styles de vie et de la défense. L'accent sera mis sur les nouvelles aptitudes et l'amélioration des capacités dans tous les secteurs mentionnés ci-dessus, et leur impact sur la société. Parmi les exemples d'applications aérospaciales spécifiques, on compte les matériaux composites légers et hautement résistants, les systèmes électroniques et les afficheurs améliorés à basse consommation d'énergie, divers capteurs physiques, les matériaux multifonctions avec capteurs intégrés, et d'autres exemples de ce que l'industrie aérospatiale peut attendre du domaine de la nanotechnologie. Les applications électriques et énergétiques potentielles seront également abordées.

L'intégration MEMS (ou microsystèmes électromécaniques)/nanotechnologie sera envisagée en tant que potentiel d'amélioration des MEMS par la nanotechnologie, et d'utilisation des MEMS pour explorer les systèmes à l'échelle nanométrique. Pour finir, une prévision des perspectives à court terme et à long terme des applications potentielles sera développée, comprenant les défis actuellement rencontrés pour commercialiser la nanotechnologie et les efforts accomplis au niveau international.

Lecture Series Director

Dr. Klaus SCHADOW (USA)
Schadow Technology
schadowkc@cox.net

Lecturers

Dr. Meyya MEYYAPPAN (USA)
MM Associates
meyya@orbit.arc.nasa.gov

Mr. Henne VAN HEEREN (NL)
EnablingM3
henne@enablingm3.com

Dr. Ayman EL-FATATRY (UK)
BAE Systems
Systems Engineering Innovation Centre
Loughborough University
a.el-fatatry@lboro.ac.uk

Local Enrolment Coordinators

Dr. Oudea COUMAR
Service TE624
EADS-ST, BP:3002
66, Route de Verneuil
78133 Les Mureaux cedex
FRANCE
Tel: + 33 (0)1 39 06 28 34 Fax: +33 (0)1 39 06 13 11
coumar.oudea@space.eads.net

Ms. Evelyn HIRT
Pacific Northwest National Laboratory (a Dept of Energy Lab)
P.O. Box 999, MSIN K5-10
Richland, WA 99352
USA
Tel: +1 509 375 4425 Fax: +1 509 375 3614
evelyn.hirt@pnl.gov

Prof. Ion STIHARU
Department of Mechanical Engineering
Concordia University
1455 de Maisonneuve Blvd. West, CR-211
Montreal, QC, H3G 1M8,
CANADA
Tel: +1 514 848 3152 Fax: +1 514 848 8635
ISTIH@VAX2.concordia.ca

Prof. Baldomir ZAJC
University of Ljubljana
Rakovniska 25
1000 Ljubljana
SLOVENIA
Tel. +386 1 476 83 49 Fax +386 1 4264 630
Baldomir.Zajc@fe.uni-lj.si

RTA Contact/Enrolment Coordinator for PfP and non-NATO

Ms. Claire POMENYA
Operations and Coordination Division
RTA Paris
Tel: +33 (0)1 55 61 22 14
Fax: +33 (0)1 55 61 96 10
pomenyac@rt.nato.int

Lecture Series Programme

DAY ONE

08:30 REGISTRATION
09:00 OPENING CEREMONY
National Authorities
09:10 Introduction - Overview
Dr. Klaus Schadow and Local Coordinator
09:30 Introduction into Nanotechnology
Dr. Meyya Meyyappan
10:30 BREAK
11:00 Fabrication
Mr. Henne van Heeren
12:00 LUNCH
13:00 Materials
Mr. Henne van Heeren
14:00 Characterization
Dr. Ayman El-Fatatry
15:00 BREAK
15:30 Lifestyle Applications
Mr. Henne van Heeren
16:30 Defense Applications
Dr. Ayman El-Fatatry

DAY TWO

08:30 Aerospace Applications
Dr. Meyya Meyyappan
09:30 Energetics and Power Generation
Dr. Klaus Schadow
10:30 BREAK
10:45 MEMS/Nanotechnology Integration for Bio-Medical Applications
Dr. Klaus Schadow
11:45 Commercialization
Dr. Meyya Meyyappan
12:30 Wrap-up
All

**APPLICATION TO ENROL
LECTURE SERIES AVT-129b**

“Nanotechnology Aerospace Applications-2006”

- USA, Seattle on 16 – 17 October 2006**
- CANADA, Montreal on 19 – 20 October 2006**
- SLOVENIA, Ljubljana on 6 – 7 November 2006**
- FRANCE, Bordeaux on 9 – 10 November 2006**

Title (Prof, Dr, Mr, Mrs etc.):

Family name, first name:

Position:

I am an employee of Govt/Industry/Academia/Other:

Office address:

Tel: Fax:

E-mail:

Nationality:

Passport no:

Passport issued at (place): on (date):

Date of birth: Place of birth:

Latest Enrolment Dates

NATO Nations **Monday, 9 October 2006**
PfP Nations* **Monday, 2 October 2006**

My role at the meeting will be:

<input type="checkbox"/> RTO Member	<input type="checkbox"/> Author
<input type="checkbox"/> Co-Author	<input type="checkbox"/> Other Participant

For use of Enrolment Coordinator:

I approve this application and have sent an information package.

Signed: _____ Date: _____

Please complete this form and send it to the Local Enrolment Coordinator* who will, upon receipt of your application to enrol, forward a general information package which will include travel advice, recommended accommodation etc.

* Participants from Partnership-for-Peace (PfP) countries must send this form to the RTA Enrolment Coordinator, Ms. Claire POMENYA.

