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Nordic Nanotechnology Workshop: conference report

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Abstract (not more than 200 words)

This report contains a brief summary of the recent Nordic Nanotechnology Workshop which the author attended. The workshop provided a forum for scientists from the Nordic region to meet and discuss plans to present pre-proposals to Nordisk Industrifond. Two groups in which the author participated are described.

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Nordic Nanotechnology Workshop: konferensrapport

Sammanfattning (högst 200 ord)

Rapporten innehåller en kort sammanfattning av nyligen genomförda Nordic Nanotechnology Workshop, som författaren deltog i. Workshopen utgjorde ett forum för nordiska vetenskapmän att träffas och diskutera planer för projektförslag till Nordisk Industrifond. Rapporten beskriver två arbetsgrupper som författaren medverkat i: Smart Functional Cluster Materials, samt Carbon-nanotube Reinforced Polymers.

Nyckelord

nanoteknik, workshop, Nordisk Industrifond

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CONTENTS

INTRODUCTION

Responding to the global attention given to nanotechnology, Nordisk Industrifond (NI) recently arranged a two day *Nordic Nanotechnology Workshop* to discuss the subject and lay the foundations for a nanotechnology initiative in the Nordic area. I attended this workshop, presented the recently started Swedish *Nanotechnology in Defence Applications* programme and participated in two of the working groups during the workshop.

The aim of the workshop was to provide a forum where many (but not all) researchers engaged in nanotechnology in the Nordic region were given the chance to present briefly some aspect of their work. Researchers from universities, research institutes, public authorities and small industrial enterprises were invited. A list of the approximately 60 participants is given in Appendix 1.

Approximately 38 short presentations were made (see the programme in Appendix 2), which gave an overview of many of the nanotechnology activities in Scandinavia. Abstracts for each presentation are available.

Following the presentations a number of discussion groups were formed (about 6, the exact number fluctuated) to discuss the possibility of presenting a pre-proposal to NI. I participated in two such groups, concerned with “Smart Functional Cluster Materials” and “Carbon Nanotube Reinforced Polymers.” Both groups were able to more or less agree to prepare and submit a pre-proposal to NI.

Smart Functional Cluster Materials

This group, consisting of about 12 persons was interested mainly in preparation of nanoparticles to be used as particles, in application areas such as biomedicine (as drug carriers, tracers or similar); inks; and pigments. By smart is meant that the nanoparticles may be coated for biocompatibility, they may be used to build up small components by laser sintering, or used in functional coatings which could include not only colouration but also corrosion protection, scratch resistance or hydrophobicity/hydrophilicity.

Carbon-nanotube Reinforced Polymers

This group, consisting of some 6-8 persons, including two small enterprises able to produce nanotubes, was primarily interested in preparing polymer-reinforced composites containing C-nanotubes. Applications were not discussed in detail, but functional composites where mechanical and electrical/dielectric properties are important were discussed. Some suggestions for application areas include: power transmission; sports equipment, wind turbine blades, fuel cells, conductive paints/coatings; structural materials (space); textiles; etc. Relevant functional properties include: electrical and thermal conductivity; specific modulus; mechanical strength; toughness; density; dielectric properties; etc. Challenges include: purification; optimum production processes (CVD; plasma; arc); surface functionalization and composite production.

THE NEXT STAGE

Nordisk Industrifond does not have a nanotechnology programme, nor has it decided to instigate such a programme. The workshop activity was intended to provide a background of ideas and proposals which can be presented to NI to motivate a nanotechnology programme.

Each group chose (or in some instances were appointed) a coordinator, with the task of preparing a brief (3-5 pages) “pre-proposal” for submission to NI. This should be done by 28 November. NI will assess these at the next Board Meeting at the end of February 2004. NI may decide to initiate a nanotechnology programme or not. Following that meeting a call for proposals may be issued, or the board may request that the pre-proposals already received be further developed into full proposals.

Submission of proposals is not limited to participants at the workshop. Anyone may prepare a pre-proposal and submit it to NI (attention Markku Lehtinen), following the usual requirements from NI. These are listed in Appendix 3. More information is available on the internet at: <www.nordicinnovation.net>.

SUMMARY

The Nordic Nanotechnology Workshop provided a forum where scientists from the Nordic region were able to meet and network with the objective of forming groups interested in presenting ideas to Nordisk Industrifond. Although there was insufficient time to complete this process, the nuclei of several groups were formed, and these are now (November 2003) preparing pre-proposals.
Nordisk Industrifonds plans for a Nordic Nanotechnology Programme are unclear, there may not be a programme at all, this will be taken up by NI at the board meeting in February 2004.

APPENDIX 1

List of participants

Nordisk Industrifond
senter for innovasjon og næringsutvikling

Nordic Nanotechnology Workshop
Stockholm, October 16-17, 2

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APPENDIX 2

The workshop programme

Nordisk Industrifond
senter for innovasjon og næringsutvikling

Nordic Nanotechnology Workshop
Stockholm, October 16-17, 2

Technical Program

Thursday October 16, 2003

09:30 **Registration**

10:00 Opening of the Meeting
M. Muhammed, KTH, SE

10:10 **Markku Lehtinen, NIF**
Nordisk Industrifond, introduction

10:20 Invited Talk:
Tim E. Harper, Cientifica, SP
Beyond Nanotechnology

11:00 **Technical Session I**: Chairman M. Muhammed, KTH, SE

Peter Stougaard, Mads Grønvold, Thomas Brevig, Lars H. Pedersen, Biotechnological Institute, Applied Molecular Biology, DK
Nanobiotechnology Activities at Biotechnological Institute

Daniel Filippini, IFM – Linköping University, SE
Natural Nanosytems for Biosensing Purposes

Kristinn Johnsen, Lyfjathroun Biopharmaceuticals, IS
Active Nano Bio Sensors (NaBioSe)

Matti Vuento, Dept. University of Jyväskylä , FI
Biological Nanoelevators

Peter Ulvskov, Juha Tuukkanen, Marie Danielle Nagel, Henk Schols, Marco Morra, DIAS, DK
Tailored Rhamnogalacturonan-Based Coatings for Implants and Medical Devices

Juha Tuukkanen,, University of Oulu, SF
Needs for Nanoscale Coating of Medical Shape Memory Metal Implants

Geir Fonnum, Molecular Systems, Dynal Biotech ASA, NO
Superparamagnetic Beads

Jan Kehr, , Karolinska Institutet, SE
Nanomaterials for Neuroimaging, Molecular Monitoring and Drug Delivery Devices: Applications of Gold-Coated Iron Oxide Nanoparticles for Tracking the Transplanted Neural Stem Cells by MRI

12:30 **Lunch**

13:30 **Technical Session II,** Chairman: Aric Menon, DTU, DK

Per Stenstad, SINTEF, NO
Biocompatible and Bioactive Polymer Surfaces and Their Applications in Medicine and Biotechnology

Bård Henrik Sundrehagen, Dalen Diagnostics AS, NO
Title: Medical Diagnostics Based on Nanoparticle Size Measurement

Lars Lading, Sensor Technology Center A/S, DK
Research and Innovation: Possibilities, Barriers, and Examples

Jorma A. Virtanen, Pentti Somerharju, Kwan Hon Cheng, University of Jyväskylä, Nanoscience Center, University of Helsinki, SF and Texas Tech.
Ionics – Future Alternative to Electronics

Olle Inganäs, IFM, Linköpings Universitet, SE
Nanopatterned Active Macromolecular Materials in Organic Electronics, Photonics and Bioelectronics,-Photonics.

Ingólfur Thorbjörnsson, IceTec, IS
The Islandic Nano Technology Forum

Jörg P. Kutter, MIC – Institute for Micro- and Nanotechnology, DTU, DK
Fluidics and Photonics on the Micro- and Nanoscale for Chemical Applications

Claus BV Christensen, Mikroelektronik Centret, TDTU, DK
Biological Detection in Microsystems

15:00 Coffee Break

15:30 Technical Session III Chairman: Snäbjörn Kristjansson, , IS

Eleanor Campbell, Göteborgs university, SE
Carbon Nanotubes: Production, Properties and Potential

Bruno Ceccaroli, n-TEC AS, NO
Presentation of n-TEC AS

Bodil Monsen, SINTEF, NO
Plasma Production of Materials (PPM), with Focus on Carbon Nanostructures

Lennart Bergström, Peter Alberius, YKI, Institute for Surface Chemistry, SE
Nanoporous colloids for functional applications

Keith Redford,
Polymers and composites, SINTEF Materials Technology, NO
Nanocomposite Materials at SINTEF Materials Technology

Esko I. Kauppinen, Helsingfors University, SF
Production Technology for Drug-Polymer Composite Nanoparticles. Aerosol flow reactor synthesis of carbon nanotubes and nano-onions from metal acetate catalyst precursors

Mamoun Muhammed, KTH, SE
Nanoparticles: Synthesis and Applications

16:40 **Technical Session IV:** Chairman Aase Hundere, NO

Mats Jonson, Chalmers/Göteborg University, SE
Nanodevices: Theory and Modelling

David P. Brown, Jorma K. Jokiniemi, Esko I. Kauppinen, VTT, SF
Advanced Modelling Tool to Simulate Nanoparticle Gas-phase Production

Jan Linnros, IMIT - KTH, SE
Silicon Nanostructures

Sveinn Ólafsson, Matvice, IS
STM Growth of Nanostructures in Liquid CH_4, SiH_4, GeH_4 at Cryogenic Temperatures.

Sveinn Ólafsson, Islands University, IS
Nanostructured Light Metal Hydrogen Storage Materials.

Johan Bobacka, Åbo Akademi, SF
Chemical Sensors Based on Functionalized Conducting Polymers

Tommy Iversen, STFI, SE
Nanotechnology for the Forest Products Sector

Per Johander, IVF, SE
Direct Manufacturing of Microsystems

18:00 **Break**

18:30 **Dinner**

19:30 **Technical Session V** Chairman: Jorma Virtanan, Univ Jyväskylä, SF

Lars Montelius, Nanometer Structure Consortium, Lund University, SE
Nanotechnology Research for Applications in Electronics and Life Sciences

Karin Hermansson, Acreo AB, SE
Nanotechnology at Acreo

Arthur D. van Rheenen, Norwegian Defence Research Establishment, NO
Nanotechnology at the Norwegian Defence Research Establishment

Steven J. Savage, Defence Research Agency, FOI, SE
Nanotechnology in Defence Applications

Martin Magnusson, Pronano AB, SE
Pronano - Institute for Nanotechnology

20:30 **Group discussions**

22:00 **End of Day 1**

Friday, October 17, 2003

Nordisk Industrifond
senter for innovasjon og næringsutvikling

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Stockholm, October 16-17, 2

09:00	**Group Discussions (cont.)** Summary of day 1	
10:15	**Break**	
10:30	**Technical Session VI**	Chairman: Lars Lading, DK
	Presentations of the conclusions of the workshop groups	
12:30	**Lunch**	
13:30	**Summary of the Workshop**	
15:00	**End of workshop**	

APPENDIX 3

Criteria for application

The Nordic Industrial Fund works to reinforce the innovative potential and competitiveness of the business community of the Nordic region.

We do this by co-financing Nordic projects that:

- create networks and increase co-operation and skills transfer between the Nordic countries
- reduce the degree of work duplication and promote synergies among Nordic actors
- are innovative and supportive to business development

Project criteria, the project should:

- Be important for the business community in the Nordic region
- Be firmly rooted in national ventures and activities
- Have participants from at least 3 countries in the Nordic region
- Contribute to sustainable development
- Contribute with own financing of at least 50% (working hours etc.)
- Not exceed a 3 years period

Project participants are often representatives of:

- The business community and its organisations
- Research departments, universities
- Research bodies and bodies financed by the business community
- Government authorities/ministries

The Nordic Industrial Fund does not provide financial support for commercial product development.

In the assessment of applications the Nordic Industrial Fund emphasises the business community‘s need for the results of the project. Furthermore, an information plan must be compiled to ensure that the business community gains access to the knowledge produced during the project period.