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## **‘Nanotechnologies for Soldier Enhancement, Protection and Support’**

*An examination of the state-of-the-art by international experts*

**Date:** 11 November 2011

**Location:** Bisley, England

### **Programme**

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| <b>9.30 – 9.35</b>   | <b>Introduction</b>   |
| <b>9.35 – 09.55</b>  | <p><b>‘An Overview of Nanotechnology for Military Applications’.</b> <i>Ottilia Saxl, founder, Institute of Nanotechnology</i></p> <p>What can nanotechnology offer in terms of solving long standing problems? Come on a tour of the potential for nanotechnology to improve soldier performance and safety, including some recent developments aimed at the military in general.</p>  |
| <b>10.00 – 10.25</b> | <p><b>‘NanoBiomimery - Applications in Advanced Camouflage and Intelligent Uniforms’.</b> <i>Professor Andrew Parker, Research Leader, Natural History Museum (London) and Green Templeton College (Oxford).</i></p> <p>Nature has evolved optimal solutions to many problems including camouflage against fixed and changing backgrounds, water collection from dews and fogs, heat management, and lightweight materials with various mechanical properties such as impact and wear resistance. Nanotechnology has enabled an understanding of how these solutions are achieved, and how they can be reproduced for a variety of applications, including defence.</p> |
| <b>10.30 – 10.50</b> | <p><b>‘Printed Nanoscale Structures for Weight Reduction in Defence Systems’.</b> <i>Dr Paul Reip, Director, Government and Strategic Programmes, Intrinsic Materials Ltd.</i></p> <p>Printed electronics offer the potential to produce lightweight structures and electronics systems on low cost substrates. New nanoscale copper based inks have been specifically developed to enable inkjet and screen printing of digital signal-capable tracks. The technology can be optimised to match the form and function requirements of defence systems where weight issues predominate.</p>   |
| <b>11.00 – 11.20</b> | <b>Break</b>  |

- 11.20 – 11.45** **‘Soldier Protection - Nano-enhanced Textiles for Surviving Extreme Environments’**. *Dr Cynthia Bedell, Commander, US RDECOM Forward Element – Atlantic*. General research in nano-materials for textile enhancements to protect soldiers is discussed. A detailed example of ongoing research into materials that can reduce heat stress while maintaining the protective capacity of garments will be given.
- 11.50 – 12.15** **‘Thin Film Technologies in Soldier Performance Enhancement and Safety’**. *Professor Frank Placido, Director, Thin Film Centre, Paisley, UK*. Thin film technologies offer many advantages to the modern soldier, offering weight reduction allied to enhanced performance and improved reliability and safety. Applications in displays, sensors, optical filters, communications, wear/corrosion resistance and portable power will be discussed
- 12.20 – 12.45** **‘Military Nanotechnology – New Issues for Ethical Debate?’** *Dr Jürgen Altmann, Technische Universität Dortmund, Germany*. The potential military applications of nanotechnology are reviewed and discussed, including soldier enhancement. A framework for their ethical assessment is introduced. Whether nanotechnology will in the long term require a revolutionary change in the international system will also be debated.
- 12.50 - 13.40** **Lunch and Networking.**
- 13.45 – 14.10** **‘Nanotechnology, Multifunctionality and the Reduction of Weight Burdens’**. *Dr Steven Savage, Research Director, Swedish Defence Research Agency*.
- 14.15 – 14.40** **‘Spare Part Surgery - Nanocomposite Polymers and their Role in Innovative Battlefield Medicine’**. *Alexander M. Seifalian, Professor of Nanotechnology & Regenerative Medicine, University College London*  
How developments in nanotechnology and nanocomposite materials are leading to the immediate treatment of burns, trauma, and vascular bleeding in a battlefield and in meeting other medical challenges.
- 14.45 – 15.10** **‘Leading Edge Technology in Portable Energy Generation, Storage and Communications Management for Field Troops’**. *André Oliveira, Tekever*. Tekever's focus is on the research and development of energy generation and management and advanced communications for dismounted soldiers. An overview of the latest techniques, including recent work with the Portuguese Army, and future nano-based developments, will be presented.
- 15.15 – 15.30** **Final Questions, Discussion. End of Workshop**