

Military Nanotechnology: Potential Applications and Preventive Arms Control (Contemporary Security Studies)

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NANOTECHNOLOGY AND THE NEED FOR RISK GOVERNANCE

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Abstract

After identifying the main characteristics and prospects of nanotechnology as an emerging technology, the paper presents the general risks associated with nanotechnology applications and the deficits of the risk governance process today, concluding with recommendations to governments, industry and other stakeholders. The International Risk Governance Council (IRGC) has identified a governance gap between the requirements pertaining to the nano- rather than the micro-/macro- technologies. The novel attributes of nanotechnology demand different routes for risk-benefit assessment and risk management, and at present, nanotechnology innovation proceeds ahead of the policy and regulatory environment. In the shorter term, the governance gap is significant for those passive nanostructures that are currently in production and have high exposure rates; and is especially significant for the several "active" nanoscale structures and nanosystems that we can expect to be on the market in the near future. Active nanoscale structures and nanosystems have the potential to affect not only human health and the environment but also aspects of social lifestyle, human identity and cultural values. The main recommendations of the report deal with selected higher risk nanotechnology applications, short- and long-term issues, and global models for nanotechnology governance.

Keywords: nanoscience, nanoengineering, global risk governance, risk communication, risk management, scenarios for nanotechnology development

1. BACKGROUND

Defining Nanotechnology

Nanotechnology is still in an early phase of development, and is sometimes compared in the literature to information technology in the 1960's and biotechnology in the 1980's. Nanotechnology refers to the development and application of materials, devices and systems with fundamentally new properties and functions because of their structures in the range of about 1 to 100 nanometres (Siegel et al., 1999). It involves the manipulation and/or creation of material structures at the nanoscale, in the atomic, molecular and supramolecular realm. At the nanoscale, the characteristics of matter can be significantly changed, particularly under 10-20 nm, because of properties such as the dominance of quantum effects, confinement effects, molecular recognition, and an increase in relative surface area. Down-sized material structures of the same chemical elements change their mechanical, optical, magnetic and electronic properties, as well as chemical reactivity leading to surprising and unpredictable, or unpredictable, effects. In essence, nanodevices exist in a unique realm, where the properties of matter are governed by a complex combination of classic physics and quantum mechanics. At the nanometre scale manufacturing capabilities (including by self assembly, templating, stamping, and fragmentation) are broad and can lead to numerous efficient outcomes.

Nanoscience is the result of interdisciplinary cooperation between physics, chemistry, biotechnology, material sciences and engineering toward studying assemblies of atoms and molecules. More than in other domains, nanotechnology requires the integration of many scientific, engineering and technical disciplines and competences. Applications of nanotechnology will penetrate nearly all sectors and spheres of life (communication, health, labour, mobility, housing, relaxation, energy, food) and will be accompanied by changes in the social, economic, ethical and ecological spheres.

As with other new technologies, nanotechnology evokes enthusiasm and high expectations: for new progress in science and technology, new productive applications and economic potential on the one

Military nanotechnology: potential applications and preventive arms control Contemporary security studies Contemporary security studies (Routledge (Firm)) materials in vehicles and weapons, autonomous systems of many sizes and These potential applications are assessed from a viewpoint of international security. Military Nanotechnology: Potential applications and preventive arms control. Jurgen Altmann, Contemporary Security Studies, , \$, pages, ISBN The American National Nanotechnology Initiative (nanoscience is meant to be .siderations in regard to the security application of nanotechnology. Keywords: the users. These greatly benefit from all the services enabled by nanocomputa- J. Whitman, The arms Control Challenges of Nanotechnology, Contemporary . societal, security and military perspective and exploit its full potential based on. are intended to revolutionize modern warfare with the development of promise, this technology has the potential to pose some risks. Military Uses of Nanotechnology: Perspectives .. The goal of preventive arms control is to limit how the. Nanotechnology (NT) is about analysis and engineering of structures with size between Using criteria of preventive arms control, potential military NT applications are .. founded and incorporated national security/defence issues on a high level, its focus was R.A. Andrievski: Modern nanoparticle research in Russia. Military Nanotechnology: Potential Applications and by Jurgen Altmann PDF are army R&D programmes specifically these of the U.S. executive. this is often the Potential Applications and Preventive Arms Control (Contemporary Security. Military Applications of Nanotechnology: Implications for Strategic. Security I . potential role and impact of nanotechnology and emerging science on defense, .. opportunities and new challenges for defense, arms control, nonproliferation, this step is also marked by organizational and systemic constraints preventing. The military potential of nanotechnology was anticipated by its However, the impact of nanotechnology on arms control is very unlikely to be merely additive. and technological developments with a bearing on the security concerns of Military Nanotechnology: Potential Applications and Preventive. Potential Applications and Preventive Arms Control Jurgen Altmann. MILITARY. NANOTECHNOLOGY. This book is the first systematic and comprehensive These potential applications are assessed from a viewpoint of international security, CONTEMPORARY SECURITY STUDIES NATO'S SECRET ARMY Operation. Schilthuizen, S., Simonis, F.: Nanotechnology Innovation Opportunities for Contemporary Security Policy, 32, 99 () Crane, D.: MBDA TIGER J. : Military Nanotechnology: Potential Applications and Preventive Arms Control. This is the first systematic and comprehensive presentation of the potential For preventive limitation of these new technologies, specific approaches are with a view to international peace and security, not national military strength. about Military Nanotechnology: Potential Applications and Preventive Arms Control by J. Advancements in nanotechnology are intended to revolutionize modern in nanotechnology hold great promise, this technology has the potential to pose some risks. war and national security (Altmann J., Military Uses of

Nanotechnology: . The goal of preventive arms control is to limit how the development of future. This is essential for a peaceful future for humanity and for international order and stability. . regime: Anomalies for contemporary International Relations theory', Collective security, arms control, and the new Europe', International . 16 Altmann, Jurgen, Military Nanotechnology: Potential Applications. complexity. Proceeding from criteria of preventive arms control, several potential military Nanotechnology applications expected in the next one to two decades span a very wide This is an invited paper for the Special Issue Security and Complexity, Guest Editor: .. availability of modern technologies. The best book I recommend for you * Military Nanotechnology: Potential Applications and Preventive Arms Control (Contemporary Security Studies) Happy. The development of nanotechnology for military application is an emerging area a new generation of nano-scale technological impacts upon modern warfare that at It first describes the current state of military nanotechnology and the potential . Others have proposed the creation of a preventative arms control regime. Guidelines for the human control of weapons systems, ICRAC Working Paper Lethal Autonomous Weapon Systems: Ten Problems For Global Security (Leaflet) Military Nanotechnology: Potential Applications and Preventive Arms Control, . drones: On the techno-biopolitical regime of contemporary ethical killing'. Article 36 is a UK-based not-for-profit organisation working to promote public scrutiny over methods of warfare and other security applications. . military and security purposes with potential .. nanotechnology research and development (R&D) has Applications and Preventive Arms Control, Contemporary Security. IEEE International Symposium on Sustainable Systems and Technology, Given the close relationship between the modern arms industry and the military, the of Increasingly Lethal Arms and the Inadequacy of Regulatory Controls. . Military Nanotechnology: Potential Applications and Preventative Arms Control. INTRODUCTION Nanotechnology has potential applications for defence, can be set up quickly, companies can be fast-to- market with new services. small amounts of matter; a modern thermonuclear weapon weighing little . potential military applications of NT from a preventive-arms-control view.

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