

# Preface

At the beginning of the twenty-first century new threats to human well being have emerged, which stem from terrorist activities. Potential use of chemical, biological, radiological and nuclear warfare (CBRN) in terrorist events is considered to be very likely, and on a small scale it has already been used in the past. CBRN threat however is not limited to malicious intentions and can be caused by a careless attitude towards the use of technology and equipment, breach of safety rules, or triggered by natural disasters or environmental pollution.

The Chernobyl catastrophe of 1986, was caused entirely by human error although not intentional, can be considered, using modern vocabulary, a 'dirty bomb' on a large scale. Shrinking of the Aral Sea due to loss of water input diverted to irrigation caused serious, perhaps irreversible changes in the environment, which led to a deterioration in the health of the local population, particularly in the North-West of Uzbekistan. More recent outbreaks of 'bird flu' and 'swine flu', which fortunately have not led to epidemics, prove the vulnerability of the human race beyond terrorist activities. It is therefore of utmost importance to develop methods of detection, prevention and protection against warfare agents.

The NATO Advanced Study Institute, took place on 1<sup>st</sup>–10<sup>th</sup> June, 2009 in Tashkent and Samarkand, the Republic of Uzbekistan. It focused on defence against biological warfare with an emphasis on applications of modern technologies and advanced materials in detection, health protection and medical treatment of the population. These include high throughput sensitive detection methods, advanced nanostructured materials and techniques for external and internal protection of human health, as well as extracorporeal methods, adsorptive materials and bacteriophages decontaminating the human organism, and neutralising incorporated CBRN agents. The ASI served to disseminate information on recent developments in the field of biodefence not only to fight terrorism and terror related events, but also to seek broader solutions to many critical problems such as clean water supplies, health impact of environmental pollution and improved healthcare.

The choice of Uzbekistan was due to the particular concern of all strata of the Uzbek society – government, military, medical care providers, scientists and civil population about the threat of terrorist activities in this part of the world. This threat is very real, not only due to the geographical location and political situation in the region, but is also aggravated by the current state of environmental pollution and

lack of proper sanitation in the area. Uzbekistan has a famous scientific and cultural heritage, which includes such great names as Abu Ali Ibn Sino (Avicenna), Ulugbek, Al-Bukhari and Al-Khorezmi to name but a few. The ASI was hosted by the Republican Specialised Scientific Centre for Emergency Medicine, which has direct scientific and practical interests in biodefence.

Scientists and medics from NATO, Partner Countries, Mediterranean dialogue countries and third countries attended the ASI. In total over 80 participants from 21 countries participated in our ASI making it a truly international event. It brought together specialists from different countries with the aim of fostering new developments and effective solutions to the current problems facing biodefence. 22 tutorial lectures, 16 short talks and over 30 posters were presented. These proceedings reflect their views on this highly inter- and multidisciplinary topic of biodefence.

This volume has been arranged in five chapters aimed at discussing nanostructured materials and methods of their characterization (Chapter I), advanced express-methods for detection and analysis of biological species (Chapter II), methods of protection (Chapter III) and medical treatment (Chapter IV) of patients with incorporated contaminants, and specifically extracorporeal methods of decontamination of the human body (Chapter V). All papers in this book have been peer reviewed prior to publication. We believe that this volume will be of major interest to researchers and students working in the area of materials science and engineering, chemistry, biosensors, biomaterials, extracorporeal methods, and therapeutics.

Biodefence

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