

Report from the first British Occupational Hygiene Society Nanotechnology Seminar, co-hosted by SAFENANO

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On the 27th September, the first British Occupational Health Society Nanotechnology Seminar was held at the Institute of Occupational Medicine in Edinburgh. The event was co-hosted by SAFENANO, and was attended by around 30 people, mostly occupational hygiene professionals.

The seminar was chaired by Professor Anthony Seaton, CBE, who began the day with a general introduction to the health & safety issues surrounding nanotechnology. He described his role in the writing of the 2004 Royal Society/Royal Academy of Engineering (RS/RAE) report 'Nanoscience and Nanotechnologies - Opportunities and Uncertainties', gave a potted history of the lead up to the production of this keystone document and an overview of the Governmental Working Groups formed since.



Professor Seaton commented on the comparisons made between certain nanoparticles (NPs) and asbestos, and the issues associated with these. He also discussed the observations which led toward the initial consideration that nanoparticles pose a health risk, such as the possible attribution of increased incidence of cardiovascular problems in heavily polluted to high levels of airborne ultrafine particles.



Professor Ken Donaldson, one of the leading experts in particle toxicology from Edinburgh University gave the first invited talk. He introduced what he described as 'the 4 Universes of Nanoparticle (NP) Toxicology': Combustion Derived NPs, Bulk manufactured NPs, Medical NPs and Engineered manufactured NPs. The dominant hypothesis for potential adverse health effects of engineered nanoparticles was then outlined, this being that NPs produce free radical production/oxidative stress/genotoxicity, which can lead to inflammatory conditions and disease. Based on this, Professor Donaldson presented an overview of the possible adverse effects engineered NPs could contribute to, covering major organ systems such as the respiratory tract, cardiovascular system and the brain. All examples were illustrated using landmark studies from eminent scientists in the field including Wolfgang Kreyling, Gunter Oberdorster and recently completed work from his own group at Edinburgh University.

Stephen Cash of NanoCentral gave a presentation on industries views on nanoparticle risk issues. He discussed the need of industry to be seen to take EH&S seriously, reminding the audience of 'the spectre of the Genetic Modification debate'. He then focussed on the Nano



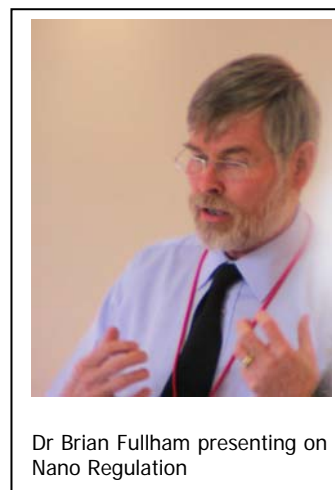
Accreditation Scheme that NanoCentral are developing in partnership with SAFENANO, the anticipated launch of which is January 2008 in the UK, and June 2008 across Europe.

Oasim Chaudhry of CSL, York summarised the growth of nanotechnologies in consumer goods and applications in his presentation. He gave examples of possibilities for Medicines, Cosmetics and Food that could be beneficial to the consumer, and also discussed potential risks in an application by application format.

The morning ended with a question and answer session with the audience who pitched the morning's experts some great questions, covering topics including regulation of nano silver, gene therapy, and paramagnetic iron use in MRI scanning for identification of atherosclerotic plaques.

The afternoon session of the seminar began with a talk from Brian Fullam, Head of the Process Safety Corporate Topic Group at HSE, who gave a presentation on the regulators view of nanotechnology. He discussed how HSE approach regulatory challenges associated with new technologies, describing HSE's relationship with Nanotechnology from its initial Horizon Scanning document, through publication of its first three nanotechnology reports. He then highlighted what they currently consider to be the main priorities for action in the field, these including:

- Engagement with researchers and companies working in the field to ensure they understand the hazards;
- Promotion a balanced precautionary approach;
- Reduction of uncertainty;
- Filling the knowledge gaps;
- Reviewing the regulatory framework;
- Engaging with the workforce;
- Engaging with the public.



Dr Brian Fullam presenting on Nano Regulation

Dr Fullam stated that the HSE does not see it as necessary that the UK adopt a separate set of nanotechnology regulations, saying that they see the existing structure of regulation as being sufficient to deal with nanotechnology. He did however stress the importance of adopting a balanced precautionary approach i.e. one that is stringent, but not as limiting as a literal adoption. He concluded his talk by discussing the problems often encountered regarding public confidence and acceptance, including loss of trust, issues of engaging a population who are not sufficiently aware of or educated in a topic, finally reminding the audience that ultimately the public decide if 'safe' is 'safe enough'.



Rob Aitken presenting SAFENANO to delegates

The penultimate presentation of the day was from SAFENANO's Director Rob Aitken. Rob began by focussing on his own specialist area - exposure, discussing the numerous factors to be taken into account when measuring exposure to engineered nanoparticles. He then went on to describe measurement methods currently available, covering concentration, size, mass and diffusion, with reference



to the Journal of Nanotoxicology review that he and Andrew Maynard of the Project on Emerging Nanotechnologies published earlier this year. Rob then introduced the audience to the SAFENANO initiative, discussing its mission, ethos and provision in the area of nanotechnology health & safety.

The final session of the day came from Dr John Cherrie, Director of Research for the IOM and President of the BOHS. John gave a presentation on the relatively uninvestigated area of dermal exposure to nanoparticles. After introducing the audience to the structure and physiology of the skin, he highlighted the natural barriers nanoparticles would meet during translocation through its various layers, and related this to the audience in terms of the flux (dermal penetration) of particles. He introduced the work that has been carried out in this area to date, summarising in particular the work of Nancy Monterio-Riviere and Sally Tinkle's respective groups. He finished his presentation by conveying to the audience the enormity of our knowledge gap, highlighting in particular the additional issues that compromised dermal functionality (e.g. damaged or diseased skin) brings to the equation.



John Cherrie discussing dermal penetration of nanoparticles

The day finished with a summary from Anthony Seaton, and a second round of questions and answers from the afternoon speakers. Overall, the day was a huge success, and enjoyed by all who attended. The presentations provided a great introduction to some of the main issues arising from the development of nanotechnologies, and gave useful insight to those who were already familiar to the area. Congratulations to the day's organiser Peter Murray and thanks to the presenters for their contributions on the day and for allowing their material to be published here.



Presenters and attendees of the BOHS Nano Seminar

*Bryony Ross,
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