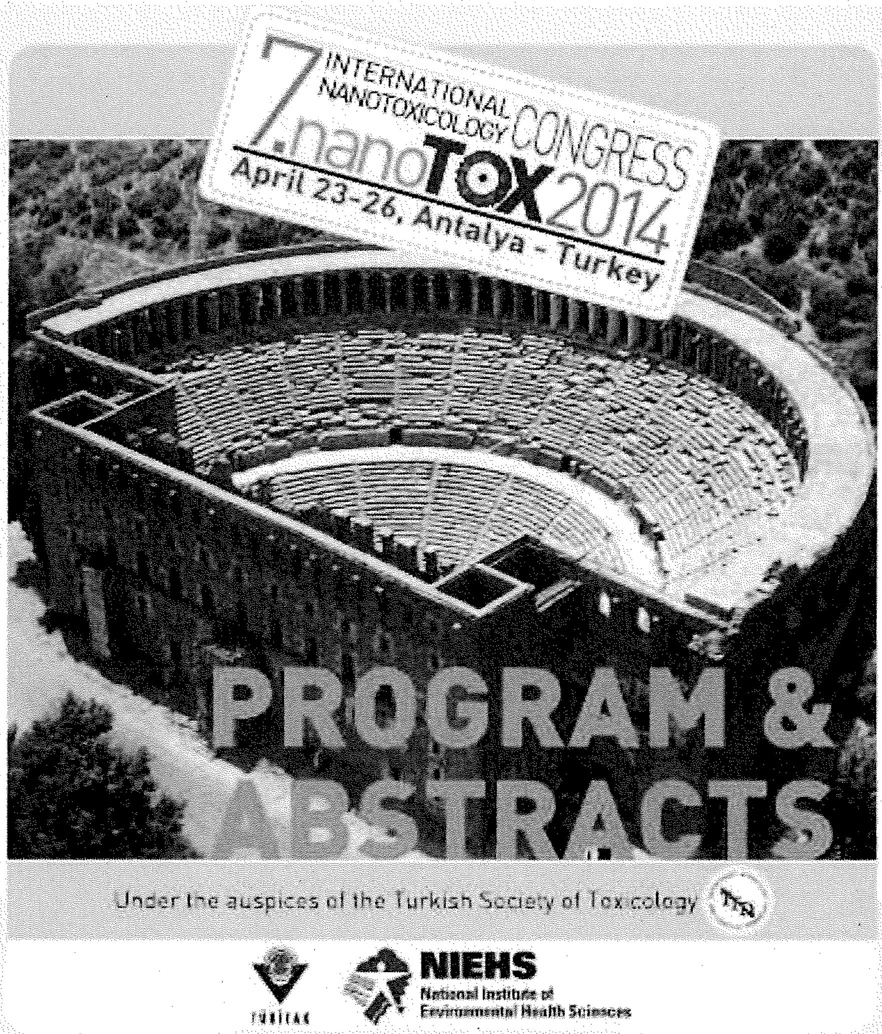
7. INTERNATIONAL NANOTOXICOLOGY CONGRESS
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PROGRAM & ABSTRACTS
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nanometers were added to Drosophila food at various concentrations 0 mg/L, 2 mg/L, 3.5 mg/L and 5 mg/L. For viability assay, male and female flies were transferred to vials containing AgNP for mating and removed after 4 days. The resulting eggs were kept in the same vials until they eclosed. Viability was determined by the number of successfully eclosed F1 adult flies. Inductively coupled plasma-mass spectrometry (ICP-MS) was conducted to verify the ingestion and accumulation of AgNPs in Drosophila. For fecundity assay, F1 male flies were isolated from treated-vials and crossed with virgin females in normal food. The number of hatched F2 adult flies indicates the fecundity of F1 male flies. To examine the effects of AgNP on adult male testis germ-line stem cell maintenance, testes were dissected out of F1 males and were stained with anti-Vasa antibody, which specifically marks germ-line stem cells. Treatment with AgNP results in a significant decrease in viability and delay in development in a dose-dependent manner. In support of this, there was a dose-dependent accumulation of AgNP in F1 flies. In addition, fecundity of treated male flies was found to be adversely affected. There was a significant decrease in germ-line stem cell number of AgNP-treated male flies as compared to the controls. In conclusion, AgNPs were found to affect the survivorship, development and fecundity in Drosophila. Drosophila is indeed a useful and robust in vivo model for future nanotoxicological studies.

P455

Dynamic coating system to modify nanoparticle surface function and reactive oxygen species generation

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Since nanoparticles (NPs) exhibit a large surface area the physico-chemical characteristics of their surface can significantly influence their toxicity including reactive oxygen species (ROS) generation. Low volatile organic compounds (LVOC) are commonly existing pollutants that have a high affinity to surfaces. Thus, we built a dynamic system to coat airborne NPs with LVOC resulting in a modified NPs surface function. Airborne particle sizing measurement showed changes of particle size distributions after coating with different LVOCs. The thicknesses of the coating can be adjusted by controlling the temperature of the LVOC generator. Both nanotracking analyses of NPs suspended in liquid and transmission electron microscopy images were used to further characterize the coating and suggested the system yields stable, replicable and well controlled surface coatings. Preliminary data showed a modification of ROS generation after coating. This agreed with the hypothesis stating chemical non-reactive coating could block the reactive zones on NPs surface and decrease ROS generation while reactive coating could contribute to redox circle resulting in increasing ROS generation. We are currently applying other analytical methods to further explore the coating effects. This design can contribute to the understanding of NPs surface function influence on nanotoxicity. In the future such a NP coating system may find interesting applications in the field of nano-medicine drug delivery.

P456

The Application of Diffusion Wave Spectroscopy to Systems containing Nanoparticles

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An established method to characterise dispersions of colloidal particles is dynamic light scattering (DLS). In DLS, the temporal evolution of intensity is related to the motion of particles and information such as particle size, shape, interactions and polydispersity can be extracted.(1) DLS is only valid for light that is singularly scattered and turbid samples, where multiple scattering takes place, are therefore inaccessible to its analysis. However, in the late 1980s an extension to DLS, christened diffusive wave spectroscopy (DWS), emerged that does allow the characterisation of opaque systems.(2-3) Here, the diffusion approximation is applied to multiply scattered light before the temporal evolution of intensity is evaluated to yield system information. Since its inception, DWS has examined a wide range of soft matter, unsuitable for DLS, such as foams, gels, and porous media. More recently, systems with two characteristic time scales have also been studied - including mixed granular-colloidal systems and foam-colloidal ones.(4-5) The latter, in particular, is a relevant model for many industrial formulations. This presentation will comprise of a review of the DWS technique and its application to mixed colloidal systems, with an emphasis on those containing nanoparticles. The impact of particle size and concentration on DWS results will also be examined and our results on mixed foam-nanoparticle systems will be presented.

(1) P. Pusey, Chapter 9 in Neutrons, X-Rays and Light, P. Lindner and Th. Zemb (Editors), 2002 Elsevier Science., (2) G. Maret and P. E. Wolf, Z. Phys. B, 65, 1987, 409., (3)