

INTRODUCTION

Nanomaterials and their enabled products are increasingly attracting global attention due to their unique physicochemical properties. However, because of the raising health and safety concerns, nano-products and their components require a rigorous toxicology and biohazard assessment.

AIM

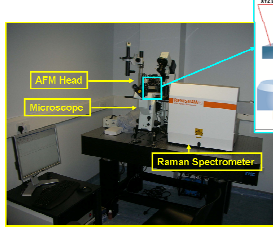
Biocompatibility assessment of silver nanowire-based thin films and various size silver nanowires.

METHODOLOGY & EXPERIMENTAL WORK-FLOW

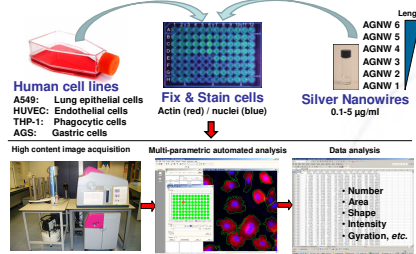
Confocal Microscopy



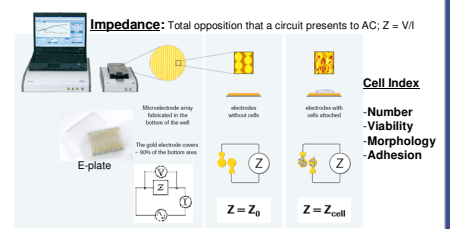
Atomic Force Microscopy (AFM)



High Content Screening & Analysis



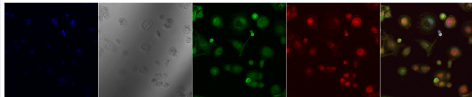
Real-time electrical impedance sensing



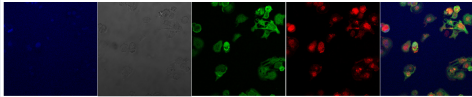
RESULTS

1. Confocal images of THP-1 cells growing over thin films containing AgNW indicating normal cellular adherence, spreading and morphology.

(a) THP-1 cells on Tissue culture plastic (control)

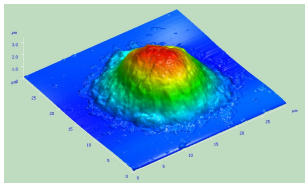


(b) THP-1 cells on AgNW containing thin film

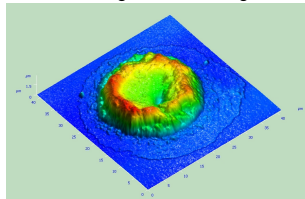


2. AFM images of THP-1 cells growing over thin films containing AgNW indicating a normal cell topology.

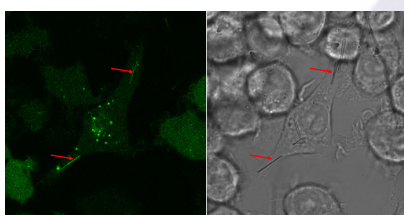
(a) A THP-1 cell on Tissue culture plastic (control)



(b) A THP-1 cell on AgNW containing thin film

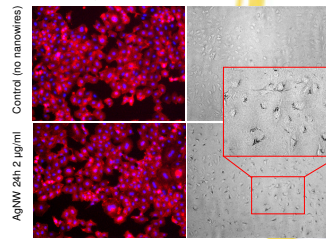


3. Confocal florescent and brightfield images indicating internalization of AgNW (red arrows) in phagocytic cells.

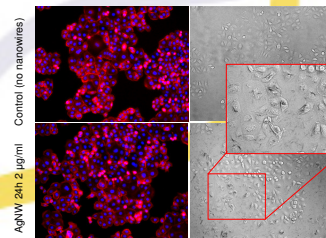


4. High Content Screening images of cells following 24h exposure to AgNW (2µg/ml). Zoomed in brightfield images indicate cellular accumulation of AgNW.

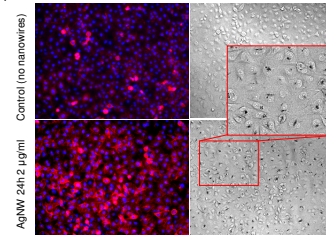
(a) A549 Lung cells



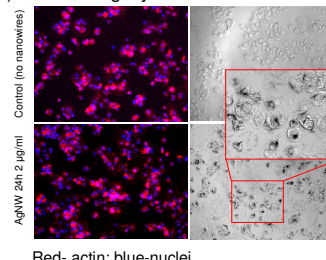
(b) HUVEC Endothelial cells



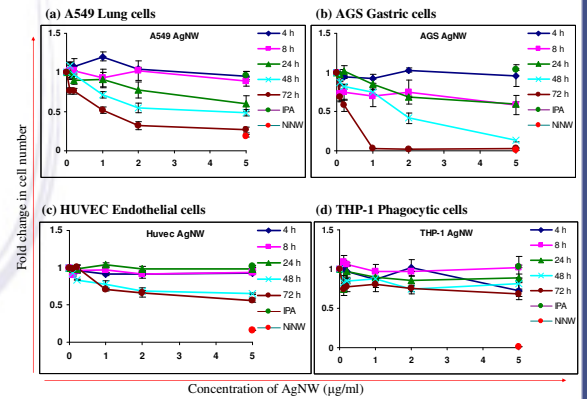
(c) AGS Gastric cells



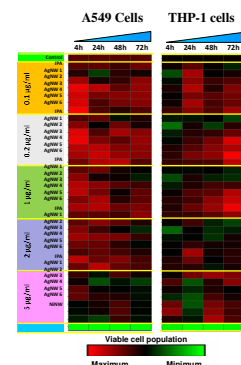
(d) THP-1 Phagocytic cells



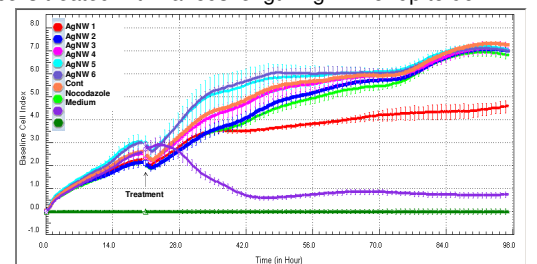
5. High Content Analysis of AGNW toxicity. Graphs show fold change in cell number (viable cell populations) following exposure to various doses of ~6µm AgNW.



6. Heatmaps generated following High Content Analysis showing cytotoxicity of various length AgNW (longest ~6µ to smallest ~3µm) at multiple time-points and doses in A549 and THP-1 cells.



7. Real-time monitoring of electrical impedance in A549 cells treated with various length AgNW for up to 96h.



CONCLUSION

Results emphasise the necessity of robust experimental procedures and multi-modal biohazard assessment of products incorporating nanomaterials. We demonstrate an *in vitro*, automated, simple, sensitive and high throughput screening perspective for the biocompatibility analysis nanomaterials and their enabled products.

ACKNOWLEDGEMENTS

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