

Additive Manufacturing for Occupational Hygiene: Processes, emissions, and exposures

SYMPOSIUM

Since the first publication on particle emissions from Material Extrusion (ME) type Fused Filament Fabrication 3-D printers in 2013, the number of articles related to particle and gas emissions and exposures associated with AM in workplace scenarios published per year has increased and reached a maximum of 16 in 2019. With time, studies on the various AM process categories has diversified beyond just the ME process category, with studies of five different AM process categories published in the last two years respectively. At the end of 2020, 45 such publications involving 22 countries was published. The objectives of the symposium are: (i) to introduce occupational hygienists (OHs) to the seven AM process categories, the particle and gas emissions and exposures associated with each category, and the anticipated health effects associated with exposure, (ii) to critically evaluate particle and gas exposure assessment strategies/methods used, and (iii) to suggest a harmonized exposure assessment strategy to be used by OHs. The symposium provides a platform to convey the current knowledge and understanding of AM emissions as an emerging occupational risk, how exposure assessments should be conducted by OHs and what is required to better our understanding of AM emissions and exposures.

Introduction to AM and the seven AM process categories

Johan du Plessis (North-West University, South Africa)

Particle emissions and exposure assessment strategies used

Sonette du Preez (North-West University, South Africa)

VOC emissions and exposure assessment strategies

Aleksandr Stefaniak (NIOSH, USA)

Adverse health effects associated with AM process exposures

Aleksandr Stefaniak (NIOSH, USA)

Suggested harmonised emissions and exposure assessment strategy and summary

Sonette du Preez (North-West University, South Africa) , Johan du Plessis (North-West University, South Africa)

MODERATOR



Johan du Plessis

He holds BSc (Biological Sciences), BSc Hons (Physiology), MSc (Physiology) and PhD (Occupational Hygiene) degrees. He is currently appointed as a Professor and Director of the research focus area, the Occupational Hygiene and Health Research Initiative (OHHRI) at the North-West University. His teaching and learning experience includes 24 years of teaching Physiology/Occupational hygiene to undergraduate students, and 17 years to postgraduate students. He has supervised more than 40 post-graduate students primarily in Occupational hygiene. To date, he has authored/co-authored 58 articles and four chapters in books and presented numerous presentations at national and international conferences. He serves as reviewer for several journals and is an Editorial Board member the Occupational Health Southern Africa journal. His research focus and expertise is on exposure to different chemical and physical stressors in the workplace. Another research interest is regulatory toxicology, in particular occupational exposure limits (OELs). He currently holds a South African National Research Foundation C2 rating as an established researcher. He is a registered Occupational Hygiene Technologist with the Southern African Institute for Occupational Hygiene and a member of the American Conference for Governmental Industrial Hygienists, the International Commission on Occupational Health and the Toxicology Society of South Africa.

SPEAKERS



Sonette du Preez

Dr Sonette du Preez is a researcher and senior lecturer in the field of Occupational Hygiene and her work is mainly focused on identifying the health risks associated with Additive Manufacturing (3D printing) processes undertaken at different facilities in South-Africa. She holds BSc (Biological Sciences), BSc Hons (Physiology), MSc (Physiology) and at the end of 2018 she completed her PhD in Occupational Hygiene titled "Emissions of and exposure to hazardous chemical substances from selected additive manufacturing technologies". She has gained a great amount of practical and research experience in the past few years by supervising 10 post-graduate students involved in occupational hygiene focusing on additive manufacturing projects. She has authored/co-authored 7 articles and is a registered Occupational Hygiene Assistant with the Southern African Institute for Occupational Hygiene.



Aleksandr Stefaniak

Aleks Stefaniak is a Research Industrial Hygienist with the Respiratory Health Division of the U.S. National Institute for Occupational Safety and Health (NIOSH). His research is broadly on inhalation and dermal exposure assessment with current focus on emissions from additive manufacturing processes. His expertise is in aerosol collection and particle characterization techniques and he actively collaborates on emissions and exposure assessments and toxicology studies of additive manufacturing process emissions.