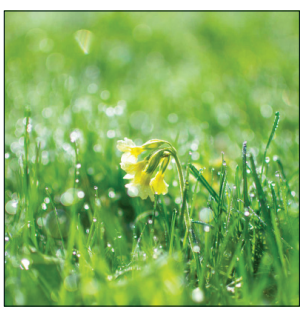
Scientific Tracks & Sessions
October 03, 2019

Recycling 2019




7th International Conference on

Recycling and Waste Management

October 03-04, 2019 | Melbourne, Australia

Sessions on

October 03, 2019

Paper Recycling | Wood Recycling | Agricultural Waste Management | Industrial Waste Recycling | Hazardous Waste Management

Chair
Jae Park
University of Wisconsin - Madison, USA

Co-Chair
Serena Caucci
UNU-FLORES, Germany

Session Introduction

Title: Deep Isolation – Development of the safety case for disposal of Radioactive wastes in horizontal boreholes

James Voss | Deep Isolation | USA

Title: Techno-environmental feasibility of wood waste derived fuel for cement production

Michael Yue Kwong Wong | The Hong Kong Polytechnic University | Hong Kong

Title: Production and Characterization of cellulose from indigenous fungal strain NSF-2 using agro industrial waste and its use in waste paper recycling

Namita Singh | Jambheshwer University of Science and Technology | India

Title: Waste cigarette filters- Negligence to effective use

Md. Moniruzzaman | Bangladesh Council of Scientific and Industrial Research (BCSIR) | Bangladesh

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Deep Isolation – Development of the safety case for disposal of Radioactive wastes in horizontal boreholes

James Voss and **Rodney Baltzer**
Deep Isolation, USA

Nuclear power is likely to be a low-carbon source of baseload energy for decades to come. One challenge remains vexing to the continued use of nuclear power, this being the safe management of radioactive wastes.

Deep Isolation has developed a safe, secure, and permanent deep geological disposal method for high-level waste, including spent nuclear fuel as well as sealed sources and other highly radioactive materials. The method uses horizontal drilling techniques and emplaces the disposal canisters in a horizontal orientation. This provides additional safety factors to those found in deep mined repositories or deep vertical boreholes.

The innovative solution uses established directional drilling technology from the oil and gas industry to drill a vertical drill hole hundreds to thousands of meters deep and then transition to a horizontal drill hole that is thousands of meters in length. The target geologic media for our disposal solution is in or below formations that have been out of contact with surface waters for hundreds of thousands to millions of years. These formations are present at various depths throughout much of the world and will ensure the suitability of the geologic environment prior to considering any location.

Work by Deep Isolation has focused on the development of the safety case for its disposal system. This paper will address the dominant features of the Deep Isolation system that establish the demonstrable case for disposal safety.

Siting: Deep Isolation is establishing a list of criteria that are necessary for the candidate site to be acceptable. The criteria include stability, the age of the water in the disposal horizon, the isolation of the water at the disposal horizon from water above and below (determined by isotopic age dating methods), and geochemistry. It should be noted that Deep Isolation is no longer focused on shales and other sedimentary rocks. After being convinced of the drilling and emplacement technology, Deep Isolation is actively considering emplacement locations in deep basement rock, provided all siting conditions are met.

Elimination of Pathways: In other disposal concepts, the process of emplacing nuclear wastes creates a pathway for its release to the biosphere. Deep Isolation is addressing this with horizontal emplacement a considerable distance from the vertical borehole. In addition, the horizontal portion of the borehole is inclined a few degrees above horizontal. These design facets eliminate two pathways for transport of radionuclides in disposal. The first is that analyses have shown that there is essentially no thermal gradient present at the vertical portion of the emplacement borehole, thus eliminating the energy source to move contaminants to the surface. These analyses have considered very high burnup fuel with minimal cooling. The slight incline of the horizontal emplacement borehole creates a preferential path for any gases evolved during the disposal process, noting that the preferential pathway is to a “dead end” – the end of the horizontal emplacement borehole. Analyses are ongoing to determine the quantity of gases expected once wastes are emplaced.

Engineered Barriers: Deep Isolation is mindful of regulatory requirements for engineered barriers as well as the cases for excluding them. Alternative canister materials are being considered for the various geologic environments that might be present in disposal conditions. In addition, Deep Isolation is evaluating alternative backfill and seal materials that would be used to close the disposal boreholes.

A comprehensive safety case is being prepared by Deep Isolation and its progress will be reported in this paper. The

current conclusion is that in a properly sited Deep Isolation disposal system, there is no native nor manmade pathway that would connect the disposal setting to the biosphere.

The stalemate seen across the globe on the disposal of spent nuclear fuel and high-level waste can be broken. Deep Isolation offers options for safe, secure, and permanent deep geological disposal of nuclear waste while reducing the time and cost of licensing, constructing, and transporting nuclear waste.

Speaker Biography

James Voss is a Senior Nuclear Engineer and President of the Terra Verde Group of Companies. He has managed radioactive, solid and toxic waste programs in over 20 countries and has advised governments and companies on decommissioning strategies. He served as the General Manager of the President's State Planning Council on Radioactive Waste Management during the terms of Presidents Carter and Reagan.

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Techno-environmental feasibility of wood waste derived fuel for cement production

Michael Yue Kwong Wong
The Hong Kong Polytechnic University, Hong Kong

Transforming waste into resources amongst industrial symbiosis networks towards circular economy has been key scientific interests. Not only for it to reduce the environmental consequences of societal waste burden, but it also improves materials efficiency and conserve natural resources. The co-processing of wood waste derived fuel (WDF) as an alternative fuel in cement production would minimize the consumption of fossil fuels and reduces the quantity of wood waste to be disposed at landfills. The techno-feasibility of consuming post-consumer wood derived fuel (WDF) in practical co-processing application is rarely reported. A trial burn of WDF in supplementing 20% of coal was successfully conducted in a cement plant in Hong Kong to evaluate the techno-environmental feasibility of the engineered WDF. The pelletized wood produced from post-consumer wood waste, which was generated mainly from waste wood pallets of the local logistic industry, was found to be suitable to be transformed into an engineered fuel for energy recovery in the cement plants, based on its physical and chemical characteristics. The stack continuous emission parameters during the WDF trial burn process complied with the statutory emission standard while the periodic sampling of particulates, dioxin, mercury, cadmium and thallium, and other heavy metals were about 60%, 2%, 21%, 6% and 7% of the statutory emission standard, regulated for baseline coal-firing operation. No adverse impact on the cement clinker production process and on the quality of the clinker produced was observed. Based on LCA, compared to using coal as the only fuel, about 16% reduction of GHGs emission was achieved when consuming WDF as a co-fuel (20%) at the precalciner. It can be concluded from the findings that WDF could be utilized as an alternative fuel for partial replacements of coal, as the co-processing met the specific process parameters and complied with the regulatory limits.

Speaker Biography

Michael Yue Kwong Wong conducted the trial burn of wood waste derived fuel (WDF) at the Green Island Cement Plant in Hong Kong in May 2017. He designed a WDF feeder process and completed the engineering, procurement and construction of project within a tight schedule of 6 months. He commissioned the equipment factory and site acceptance testes, the biomass logistics, the actual 24/7 pilot plant operation, the fuel and emission sampling and testing, as well as the writing of the final project report. In which his works has proven the feasibility of using WDF as an alternative fuel (AF) in cement plants leading to the subsequent licensing exercise for the commercial use of WDF and other AFs in the cement plant. His role as a Process Superintendent in recent years is to improve the plant process and to explore the opportunities of efficient use of alternative fuel and raw material (AFR) recycling. Prior to that he worked as a Project Manager under a corporate venture capital environment involved in the environmental business development covering MSW co-combustion and Hydrogen energy and hybrid mobility. He earned his undergraduate degree in Chemical Engineering from the University of Alberta and sub-degree in Industrial Occupation Safety from the Hong Kong Polytechnic University, and pursued and received his post-graduate degrees in Environmental Management from the University of Hong Kong and Finance from the Chinese University of Hong Kong. His early exposure on the application of AFR involving the recycling of Coal Ash, FGD Gypsum and a chemical waste MARPOL derived fuel (MDF) dates back to 1993-1996 with his first job as a Process Engineer.

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Production and Characterization of cellulose from indigenous fungal strain NSF-2 using agro industrial waste and its use in waste paper recycling

Namita Singh and **Anita Devi**
Jambheshwer University of Science and Technology, India

The study, present the production of cellulase using agro-industrial waste, its purification and characterization. A fungal strain NSF-2 isolated from the plant litter produce high amount of cellulase. 15.59 fold purified enzyme achieved specific activity 71.421 U/mg. Under the optimum condition, Vmax and Km for the enzyme were 1.5 mg/ml/min and 3.2 mg/ml respectively. Purified cellulase stable in non-ionic surfactant like TWEEN -20, Triton X-100 on the other hand salt like urea, EDTA and SDS inhibited the enzyme activity up to 65%, 50% and 55% respectively. The study also reveals that Hg2+ is a non-competitive inhibitor of cellulase. The Vmax was decreasing with increasing concentration of metal inhibitor. The purified and crude cellulase produce by NSF-2 strain is well suitable in industrial application such as pulp and paper for waste paper recycling which also reduces the use of chemical thus help in waste water management also.

Speaker Biography

Namita Singh completed her Masters and Doctorate degree in Microbial Biotechnology from Institute of Microbial Biotechnology, Barkatullah University, Bhopal (India) in collaboration with Ben- Gurian University, Israel. She is presently working as Professor at the Department of Bio and Nano Technology, Guru Jambheshwar university of Science and Technology, Hisar, Haryana, India. She has over 22 years of research and 17 years of PG teaching experience. She has guided 15 Ph.D., 96 M.Sc., 4 M.Tech. and 2 M.Phil. students till so far. Presently, 6 Ph.D. scholars and 9 M.Sc. students are pursuing research under her guidance. She had received various prestigious fellowships such as UNESCO-American Society For Microbiology, PDF by Jacob Bluestein Institute for Deserts Ben-Gurion University of Negev sde Boker Campus, ISRAEL. She had received EP Odum Gold Medal from International Society for ecological communication in June 2009. She is a widely travelled person. She had done several international academic visits in various countries such as Israel, Japan, Germany, Canada, England, Dubai, Ukraine & Ethiopia. She is also the member of various National and International scientific societies of repute. She had coordinated over 30 national/ international conference/ workshop/ seminars/ training programs. She has published 40 national and 60 international publications, 1 book, 3 manual, 123 sequence published on NCBI & 1 Patent. She is the Deputy Coordinator of SAP DRS I & II at Department of Bio and Nano Technology, GJUS&T, Hisar. She has completed eighteen national projects successfully and currently working on 03 national and 01 international Project. She has received several grants from national and international funding agencies like DST, UGC, DBT, HSCST, MOEF Haryana etc. to support her research activities.

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Waste cigarette filters- Negligence to effective use

Md. Moniruzzaman
Bangladesh Council of Scientific and Industrial Research (BCSIR), Bangladesh

An estimated 5.6 trillion filtered cigarettes were consumed worldwide in 2002 and nine trillion to be projected by 2025. With global cigarette consumption on the rise, the global environmental burden of cigarette litter could be significantly intensified in the coming years unless there is a change in the manner in which global population dispose of these cigarette buds. Due to the persistent nature and volume of cigarette buds discharged into the environment, it is high time an alternative use of this discharged waste to be found out. Utilization of waste cigarette in removal of industrial dye from waste water has already been reported. But the fate of these waste cigarette filters adsorbed by dyes are yet to be discovered. Desorption of these filters will not be the solution in this case as it will ultimately be back to ground zero. Production of paper from the filters might be a suitable solution as cigarette filters are composed of cellulose acetates and we all know paper is ultimately made from cellulose. Employing alkali treatment followed by bleaching and acid hydrolysis can be adopted for the extraction of cellulose from cigarette filters. But removal of alkaloids and tar from the fiber of cigarette filters will be a great challenge.

Speaker Biography

Md. Moniruzzaman has completed his B.Sc in Engineering in Chemical Engineering & Polymer Science from Shahjalal University of Science & Technology, Sylhet, Bangladesh. He has joined Bangladesh Council of Scientific & Industrial Research (BCSIR) as Scientific Officer in 2011. Before that he worked as Graduate Trainee Engineer at Karnaphuli Fertilizer Company (KAFCO), Bangladesh. He has been working on the removal of dyes and heavy metals from waste water using indigenous sources and published articles on various journals.

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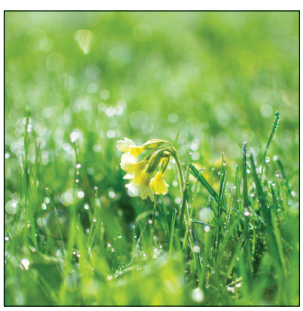


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Effect on human health by defective E-waste Recycling Practices in India: A case study

Zofail Hassan and **D K.Dhusia**
Jamia Millia Islamia, India

E-waste is one of the fastest growing waste streams in the world. With enormous generation of ewaste, India ranks fifth after China, US, Japan and Germany. According to the Global E-Waste Monitor 2017, India generates about 2 million tonnes (MT) of e-waste annually and has treated only 0.036 MT of its e-waste in 2016-17. In India, over 95 percent of E-waste being treated and processed in the urban slums of the country by informal sector like kabadiwalas, scrap dealers and dismantlers. Extraction of precious metals like Fe, Al, Cu, Cd, Ag, Au, Pd, and Ph by unskilled workers including children without personal protective equipment are detrimental not only to their health but also to the environment. The paper adopts cross-sectional study design to gain insights into health risks and defective recycling practices of workers. Dermal contact, ingestion, and inhalation have been identified as important factors which expose the worker to various health hazardous problems. The study reveals that significant levels of pollutants have been found in the human body either working or associated with informal WEEE treatment been performed. This indicates that overall the e-waste workers are at the risk of adverse health effects. Therefore, the importance of safety programs and management regulations for e-waste workers cannot be under emphasized.

Speaker Biography

Zofail Hassan is a Research Scholar pursuing his Ph.D (Doctoral Program) from Department of Commerce & Business Studies, Jamia Millia Islamia, (A central University, Government of India), New Delhi, India. His area of interest is e-waste management and working under the supervision of Dr. Devendra Kumar Dhusia, a core faculty member of the Department, who has vast experience in the field of academics and research. During his Doctoral Program, he has accolades with ICSSR fellow (Indian Council for Social Sciences Research), which is one of the premium institute for social science research in India established by the Government of India.Recently, he has presented his paper on topic "E-WASTE AWARENESS LEVEL OF END USER'S - A REALITY TEST" in a UGC sponsored national conference held by Aditi Mahavidyalaya, Delhi University and was conferred with best paper award.

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