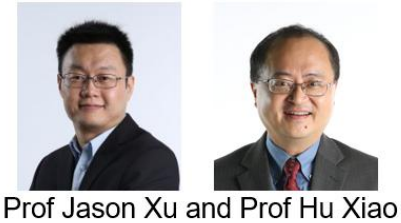
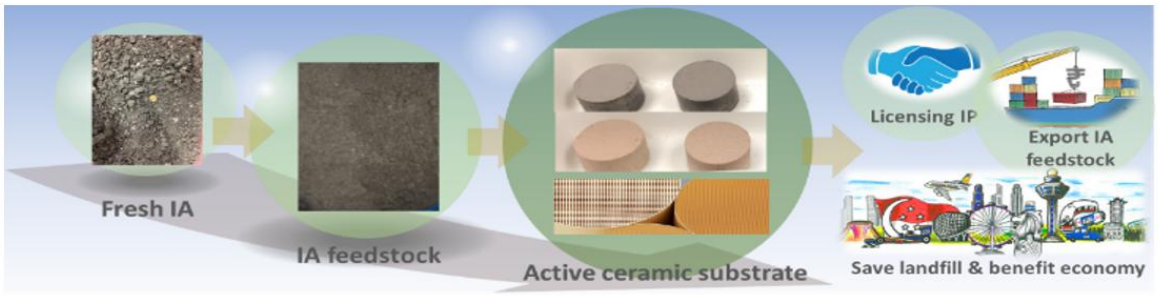
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Nanyang Environment and Water Research Institute

CATALYTIC ACTIVE CATALYST SUPPORT USING INCINERATION ASH

Abstract:
It has become a major concern to the management of large amounts of ashes being generated after waste incineration in Singapore. With the constantly increasing ash volumes, the burden of Semakau Landfill - the offshore landfill in Singapore is getting heavier. Currently, the reuse of incineration ash (IA) are very limited and restricted due to their potential environmental concerns (mainly heavy metal release with rainwater). Here, we propose a new concept/technique to develop IA as catalytically active ceramic catalyst/substrates.

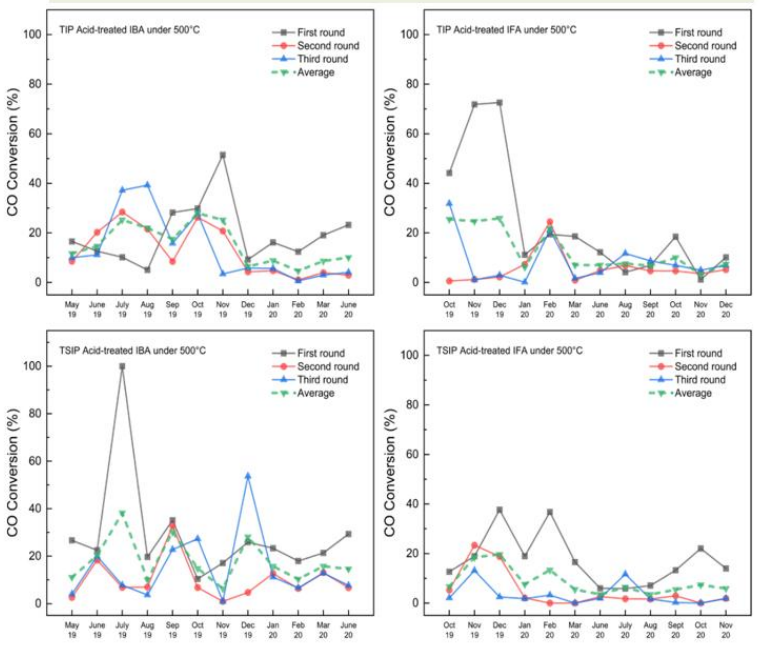
The product is aimed to replace the inactive ceramic support made from cordierite ($2MgO\text{-}2Al_2O_3\text{-}5SiO_2$), which has been widely used in the auto-vehicles three-way catalytic converters (TWCC) and other stationary air filter facilities. IA will be modified via a simple physical-chemical method and processed into ceramic catalyst blocks with moldable shapes. Physical-chemical properties and catalytic activities of the developed prototypes will be tested in the laboratory and by industrial partners. Through this cost-effective, functionally efficient and safe solution, approximately 20-25% of the IA produced in Singapore can be consumed annually and converted into valuable feedstock resources as exporting products. The landfill burden is expected to be relieved. Additionally, approximately 2 billion SGD profit is expected to be created each year through this waste-to-resource technique.


PIs: Prof Jason Xu and Prof Hu Xiao



Incineration bottom ash (IBA) and incineration fly ash (IFA) collected monthly from Tuas Incineration Plant (TIP), Tuas South Incineration Plant (TSIP) and REMEX.

Catalytic CO oxidation performance of IBA and IFA collected from TIP and TSIP.



Patents hold by this project:
"Lithium Sulfur Battery Additives Using Incineration Ash and The Approach." NTU Ref: 2022-405
"Recycled Incineration Ash as Heterogeneous Fenton-Like Catalyst for Dye-Polluted Wastewater Treatment." NTU Ref: 2022-097