Personal details and contact info

Title	Full Name
Mr	Fidal Ibrahim Bashir

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Education and awards

Education:

- BSc (Eng) in Chemical Engineering, Budapest university of technology and Economics, Hungary, 2011
- MSc (Eng) in Environmental Engineering, Pannonia University ,Veszprem, Hungary, 2014
- MEng- in Engineering Management, Ahmadu Bello University, Zaria, Nigeria, 2018.

Awards:

- Certificate of merit, best graduating student Chemical Engineering Department, The University of Technology Budapest. 2010
- MSc Scholarship , MOL nyrt and Pannonia university joint scholarship , 2012
- PhD Scholarship, Petroleum technology development fund, Nigeria , 2018

Personal affiliations

- *Associate Member*, Nigerian Society of Engineers
- *Associate Member,* Nigerian Institute of Safety Professionals
- *Associate Member Society of Petroleum Engineers*
- *Early Career Researcher Member* , UKCCRSC

Bio

Fidal holds a BSc in Chemical process engineering, an MSc in environmental engineering and has completed all course work in acquiring a MEng in Engineering management. He has served in different industry and academic positions which include: three (3) years in the Hungarian National oil company MOL Nyrt as a project engineer and technologist for Pipeline maintenance and logistics, fifteen (15) Months with Kaduna Electricity distribution company in Kaduna Nigeria as a senior compliance officer and one (1) year with Baze University Abuja as a lecturer 2 at the faculty of engineering. He joined the department of chemical engineering in October 2018, and is currently part of the CO_2 capture, utilization and storage group in the department, researching on CO_2 utilization in the iron and steel industry with emphasis on techno-economic assessment of methanol production from steel off-gases and biomass.

Research interests

Project title

Techno-economic Assessment of Methanol Production from Biomass and Steel Production Waste Gases

Summary

The iron and steel industry represents the largest energy consuming manufacturing sector in the World. Steel off gases are energy rich by-products, these gases are often used as fuel within the plant to produce power or combined heat and power. This research was born out of the great interest in utilising by-product steel gases to produce high value chemicals such as methanol, instead of heat and power. There is also interest combining the process with biomass via gasification in order to reduce the specific CO_2 emissions.

Methanol production integrated in a steel plant is believed to be cost-effective and may result in environmental benefits. This represents one of the few opportunities for CO_2 utilisation where there is enormous range and volume of potential applications, most notably for automotive fuels.

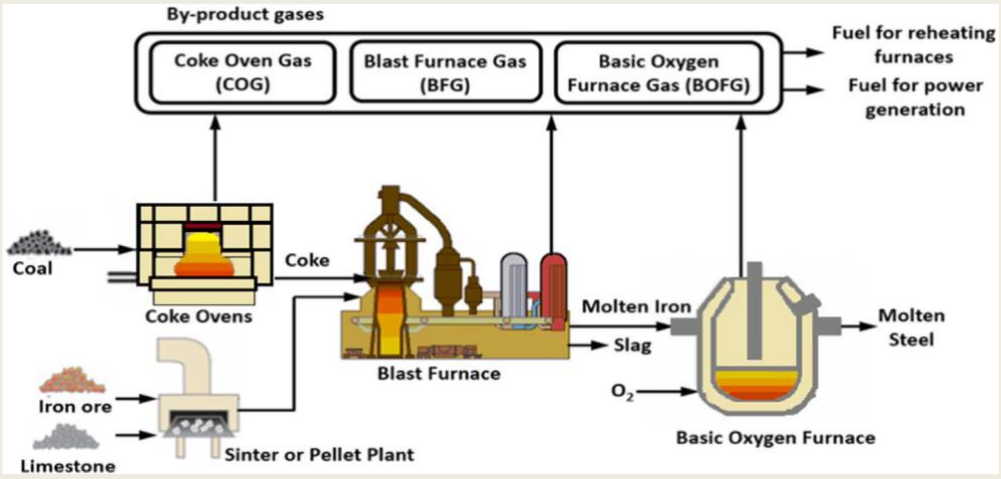

Fig. 1. The integrated steelmaking process and the typical utilisation of steelwork off-gases.

The main objective of my PhD is to explore the economic feasibility for methanol production from steel off gases and biomass based syngas. The project will involve the assembly of an overall process model to evaluate the impacts on the mass and energy balances. Different processes will be evaluated with different feeds and unit operations. The overall process models will then be integrated with engineering cost models to estimate the capital and operating costs of the process plant and to ultimately provide a cost estimate for methanol production from steel gases and biomass synthesis gases.

Table 1: *Typical gas composition of the main steel off gases*

Component	**BOFG**	**BFG**	**COG**
CO	58	20	6
CO_2	20	24	2
H_2	4	3	63
N_2	18	53	4
C_2H_6	0	0	3
CH_4	0	0	22
Density(MJ/NM^3)	1.38	1.40	0.42
LHV(MJ/NM^3)	7.6	2.85	17.5

For biomass gasification, sorption enhanced water gas shift reaction process with in situ CO_2 capture by solid sorbents in the gasifier represents an intensified option for producing a H_2-rich product stream. In addition to enhanced H_2 production, due to a shift in the key equilibrium reactions of gasification, this process has, in fact, several advantages including:

a) The production of a concentrated stream of CO_2, suitable for geological storage.

b) The exothermic carbonation reaction can supply most of the heat demand of the endothermic gasification reactions;

c) Particles sorbents, such as limestone and dolomite, show some catalytic activity for tar reforming and cracking.

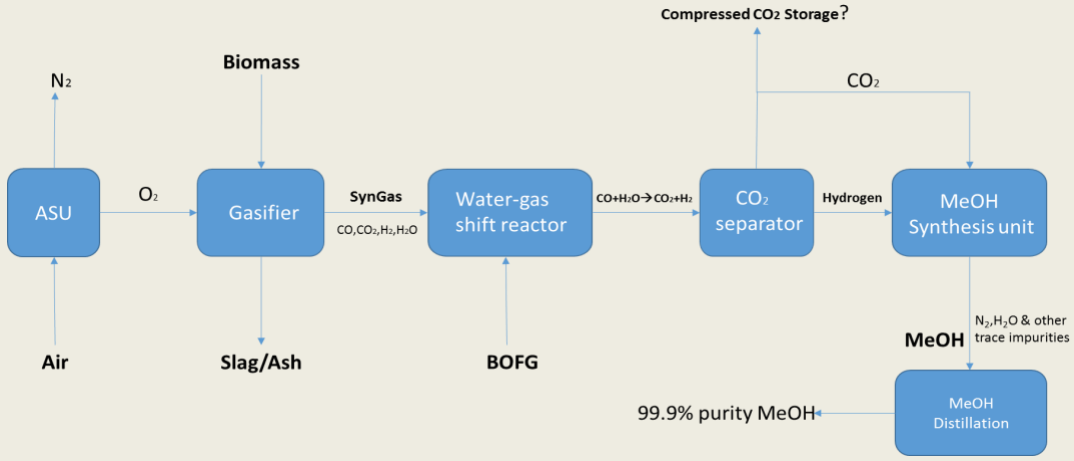

Fig. 2. Proposed flowsheet of Methanol from BOFG and Biomass

Similarly, the sorption-enhanced water gas shift (SE-WGS) reaction, where the catalytic WGS reaction and by-product CO_2 removal are carried out simultaneously in a single reactor, has received considerable attention as a novel method for high-purity hydrogen production. This process can be applied to both biomass derived syngas and BOF gas. A further option is the combination of H_2 separated from COG and CO from BOFG using PSA to synthesize methanol. Another objective of the PhD project is to assess the techno-economic advantages of applying in situ CO_2 capture processes for methanol synthesis when using either biomass or BOF gas as feedstock.

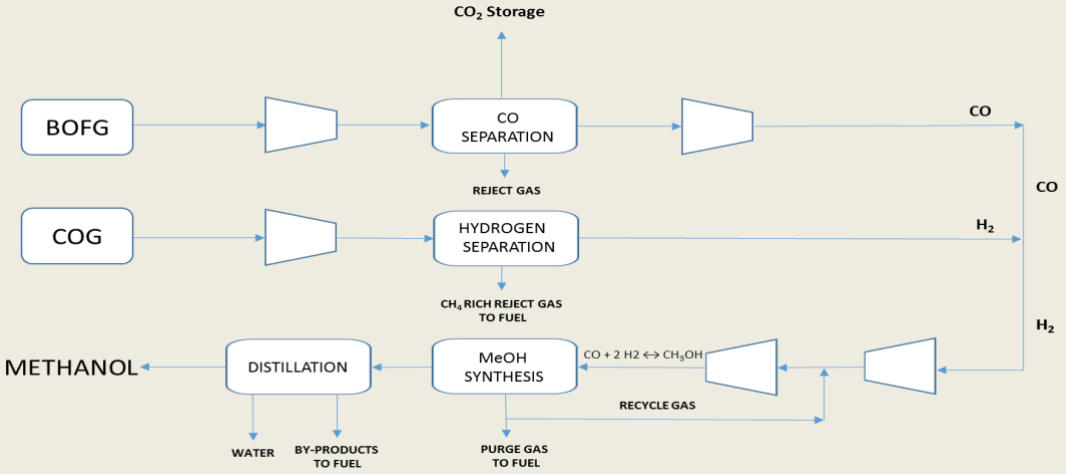

Fig. 3. Proposed flowsheet of Methanol from BOFG and COG

Supervisors		
1. Haroun Mahgerefteh	2. Yazaydin Ozgur	3. Richard Porter

Publications

Anastasiou, A. D., Mouza, A. A., Makatsoris, C., Gavriilidis, A. (2013). Application of μ-PIV for investigating liquid film characteristics in an open inclined microchannel. Experimental Thermal and Fluid Science, 44, 90-99

Teaching

Research group

Additional information