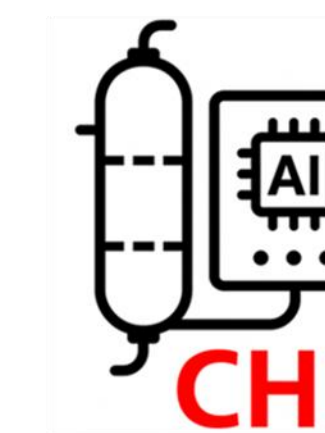
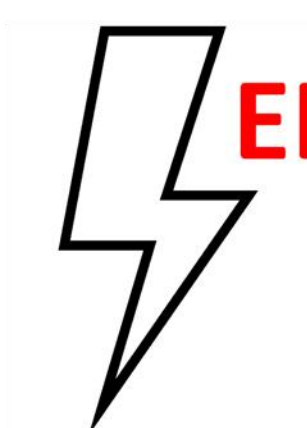


Designing a Batch Electrochemical Reactor for Fuel Refining via Desulfurization

Osamah Algamedi, Mohanad Alshehab, Yousef Basaffar, Mohammed Alkhaldi (Font size : 48)
Coach:Dr. Ismail Al-Maraj(Font size : 48)



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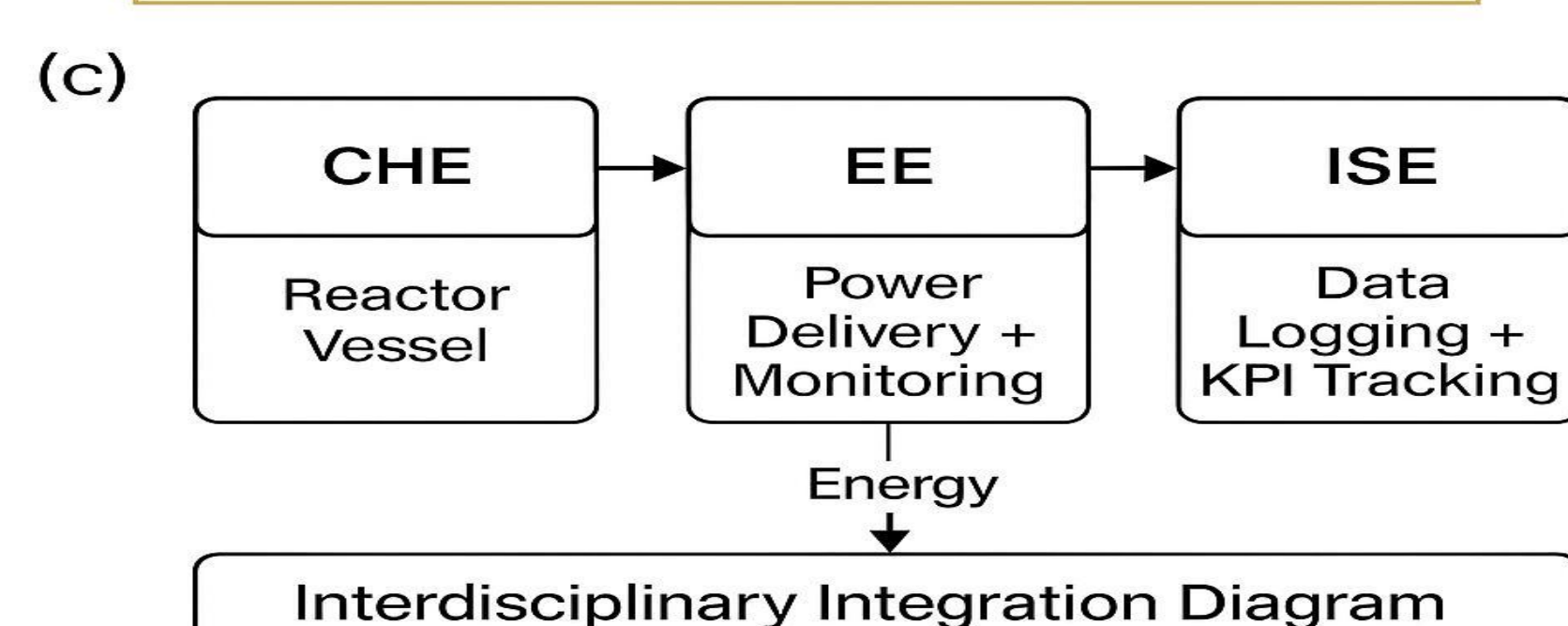
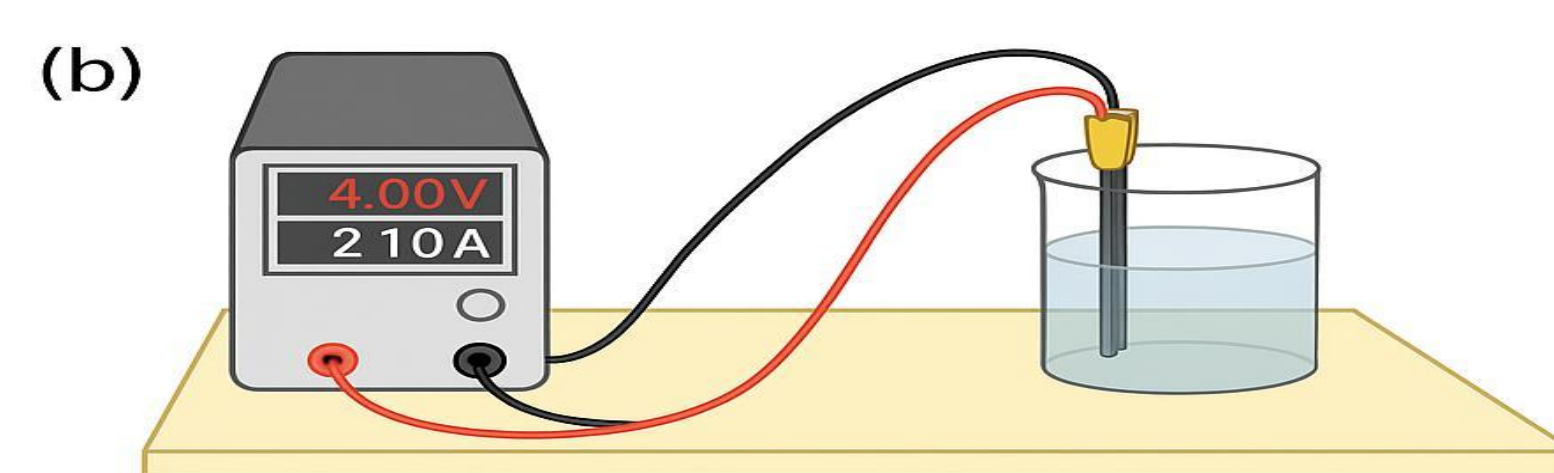
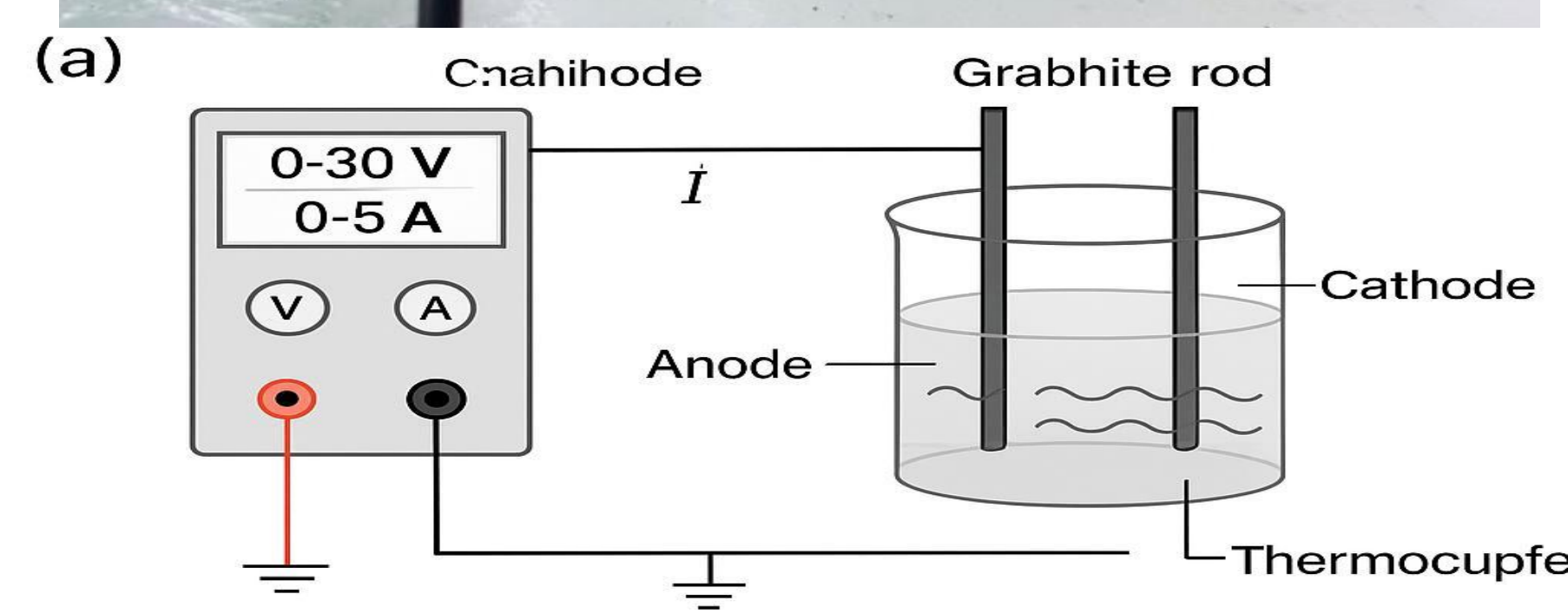
Idea

Our idea is a simple electrochemical reactor that removes sulfur from diesel without hydrogen and at low temperature and pressure



Problem and Solution

The problem is that current desulfurization needs high energy and hydrogen. Our solution is an electrochemical method that removes sulfur cheaply and safely



Data

We collected data on voltage, current, and temperature using graphite electrodes in diesel to observe the reaction behavior

Time (min)	Temp (°C)	Voltage (V)	Current (A)	Physical Change
0	18.6	4.6	0.03	No change
5	18.8	5.0	0.04	Small bubbles on cathode
10	18.9	5.6	0.06	Bubbles forming
15	19.0	6.7	0.09	Bubbles forming
20	19.3	8.3	0.14	Bubbles on cathode & anode
25	20.3	14.6	0.33	Excessive bubbles on both electrodes
30	21.7	14.4	0.33	Excessive bubbles on both electrodes

Results

The reactor showed stable current, safe temperature, and a working electrochemical reaction, proving the concept works

EMASoft Elemental Analyser

Laboratory Information

Name: March 2025

Address:

Phone: Email:

Notes:

S/N: 688596 SW Ver.: 2.0.2.0

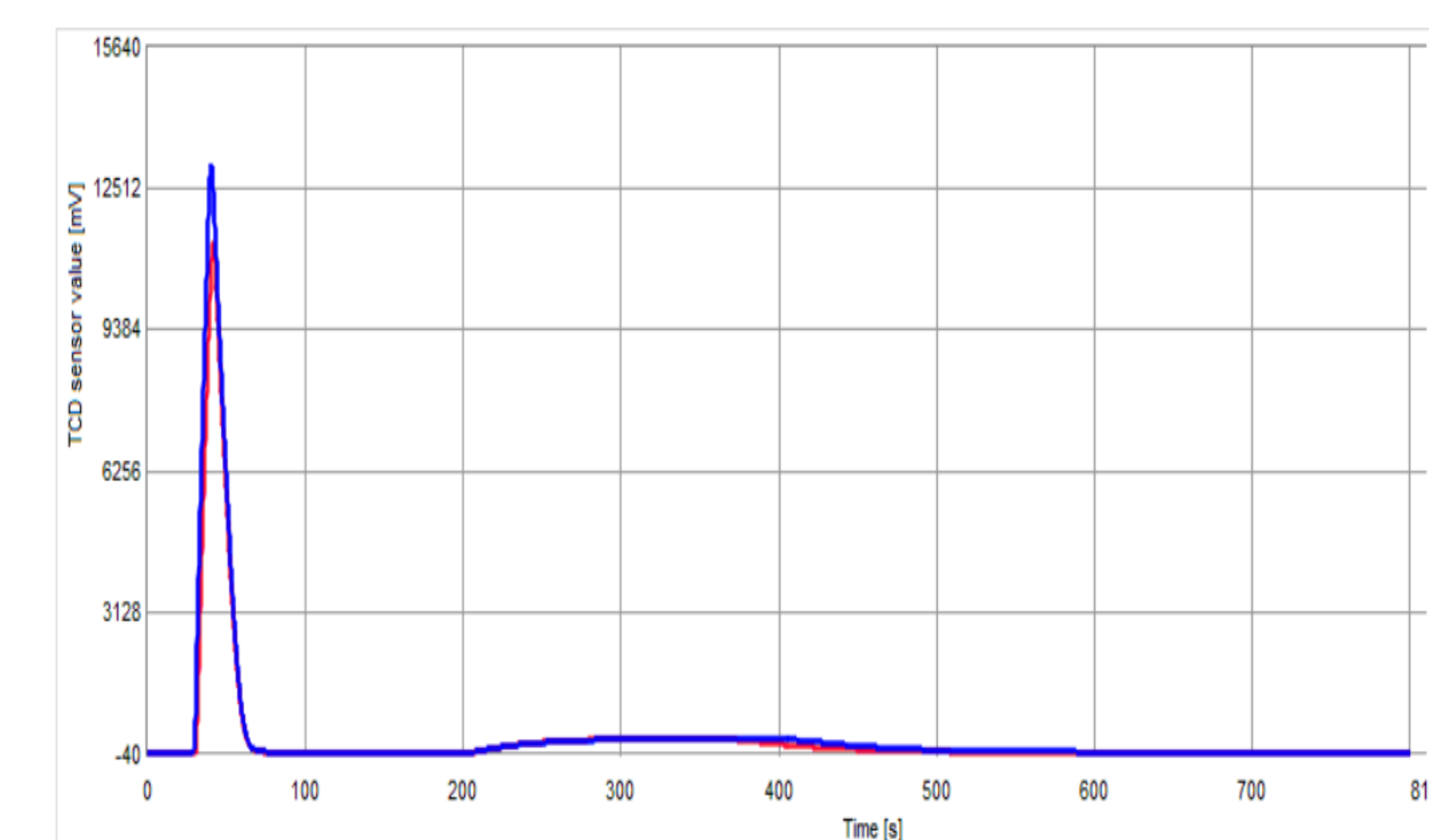
Operator:

General Features

ID	Date	Time	Sample name	Weight [mg]	O2 Flow rate [ml/min]	O2 factor [ml/mg]	Analysis time [min]	GC Oven T temperature [ml/min]	Flow mtc1 [ml/min]	Flow mtc2 [ml/min]
414	30/11/2025	15:25:47	Raw Diesel	4.401	300.0	1.6	13.23	55.5	125.8	147.2
415	30/11/2025	15:40:06	Diesel	3.439	300.0	1.6	13.23	55.5	125.9	147.1

Results

ID	N area [mV x s]	N [mg]	C area [mV x s]	C [mg]	H Area [mV x s]	H [mg]	S area [mV x s]	S [mg]	N [%]	C [%]	H [%]	S [%]
414	114.4	-0.0032	204764.2	3.4407	80385.6	0.4856	0.0	0.00159	-0.0717	78.1809	11.033	0.0361
415	60.1	-0.0057	171554.5	2.8849	68769.3	0.4161	0.0	0.00003	-0.1643	83.8891	12.0992	0.0009



Calibrations

Formula	Name
N Calibration $Y = -8.414457E-3 + X * 5.208157E-5 + X^2 * 0.000000E+0 + X^3 * 0.000000E+0$	Luqman march 2024
C Calibration $Y = 1.381590E-2 + X * 1.684730E-5 + X^2 * 0.000000E+0 + X^3 * 0.000000E+0$	Luqman march 2024
H Calibration $Y = 4.818453E-3 + X * 5.803661E-6 + X^2 * 0.000000E+0 + X^3 * 0.000000E+0$	Luqman march 2024
S Calibration $Y = -2.894891E-2 + X * 5.287666E-5 + X^2 * 0.000000E+0 + X^3 * 0.000000E+0$	Luqman march 2024

