新型生物膜用于工业污水处理

Application Of Biofilm In Industrial Wastewater Treatment

Xi'an Jiaotong-Liverpool University 西交利物浦大学

HUMAN PRACTICES


Communicate with Prof. Chen on bioreactor


Ask for advice on modeling


Pollution monitoring enterprise


Green Jiangan public organization for pollution supervision


Prof. Raju expert in biofilm, MBR, microbiolo-

Reflection and Communication
Safety
Device modeling
Experimental design

Human Practices: project improvement

Field interview
Monitoring enterprise
Public organization
Sewage water treatment

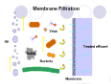

Wastewater purification plant

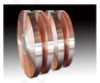

Doctor of Environmental Engineering, Chinese Academy of Sciences

Online survey
Bioreactor
Processing plant
Membrane filtration

Collaboration
Exchange ideas
Make friends
Improve project and techniques

Hold fresh water bioremediation with NFLS


Jiangxi Electronics Factory


Investigate Suzhou Copper strip processing plant for the process of sewage treatment


Hold online meet-ups with 9 teams

Take part in north-south forum

WET LAB

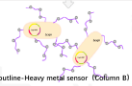
A Column ： We use E.coli MG1655 as model cells. CsgA and MBP gene fragements are inserted in plasmid. CsgA gene takes charge for curli fiber synthesis in E.coli membrane. MBP can capture and absorb heavy metal ions. (Cu^{2+}, Ag^{+}....)

B Column: We insert heavy metal sensor in plasmid. GFP synthesizes via different heavy ions concentration (Cu^{2+}, Ag^{+}). It is used to evaluate whether the heavy metal concentration acheives government effluent standard.

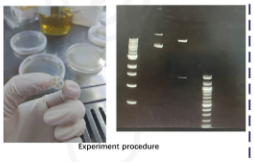
A

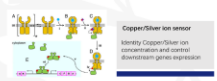
Experiment improvement- biofilm increasing

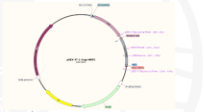
B


Experiment outline-Heavy metal sensor (Column B)

C


Experiment procedure





D

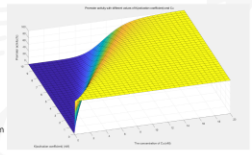
DRY LAB

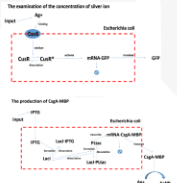
Part A: Biological Pathway kinetics

(1) The production of CsgA-MBP (CsgA binding material binding peptide by a linker) controlled by IPTG with tac promotor

(2) The production of AgNP by material binding peptide

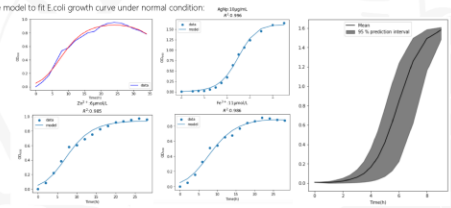
(3) The recognition of Ag^{+} by a Two-component system (CusS-CusR system)





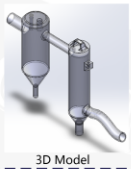
Part B: Mathematical modeling for E.coli survival curve analysis

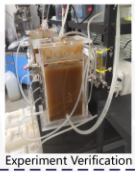
Use model to fit E.coli growth curve under normal condition:



Part C: Optimized hardware design and Engineering cycle (Fluid dynamics & iterative engineering cycle etc.)

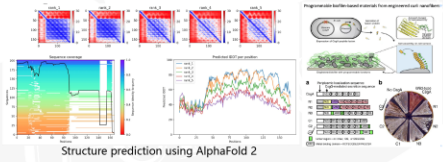

Concept Design


3D Model


Experiment Verification


Industrial Application

Part D: Improvement of Parts （MBP optimization modeling & Molecular docking)


Structure prediction using AlphaFold 2

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