

Dr. RAJASEKAR ARULIAH

Research Fellow

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Professional Objective

To secure a full time pivotal position in organizations engaged in Research & Development that offers both a challenge and a good opportunity for growth.

Educational qualification:

DEGREE	COLLEGE & UNIVERSITY / INSTITUTION	YEAR OF PASSING	AGGREGATE MARK SCORED	GRADE
PhD Microbiology	Central Electrochemical Research Institute (CSIR), Karaikudi – 630 006 Bharathidasan University, Tiruchirappalli, India	May 2008	Highly commented	
M.Sc., Microbiology	Sri Paramakalyani college, Alwarkurichi. Manonmaniam Sundaranar University, Tirunelveli, India	2000	67	First
B.Sc., Biochemistry	S.Chattanatha karyalar College, Tenkasi. Manonmaniam Sundaranar University, Tirunelveli, India	1998	78	First

Doctoral thesis title: “Identification of hydrocarbon degrading bacteria by 16S rDNA gene sequencing and their role on corrosion of petroleum product pipeline”.

Postdoctoral work title

- ✓ A novel approach for the recovery of copper and precious metals from low-grade ores using a combination of bio-oxidation and bio-leaching techniques
- ✓ Elucidating Microbial Cell-Surface Interactions and Inhibiting Biofilm Formation for Biocorrosion Control” Biorecovery of precious metals (Au, Ag, Pd, Pt) from miner ores; Bioaerosols estimation by novel techniques

Employment Details:

S.No	Period	Details
1	01-04-2010 to 31-12-2012	Research Fellow Department of Civil and Environmental Engineering, National University of Singapore, Singapore-117576
2	22-01-2008 to 31-03-2010	Research Fellow Department of Chemical & Biomolecular Engineering, National University of Singapore, Singapore-117576
3	05-04- 2006 to 09-01-2008	Senior Research Fellow (SRF) awarded by CSIR (Council of Scientific & Industrial Research), India Central Electrochemical Research Institute (CECRI), Karaikudi, India
4	13-10-2005 to 31-03-2006	Junior Research Fellow (JRF) at CECRI Evaluation of Engineering materials for Marine condition with special reference to corrosion and biofouling” funded by BRNS , Dept of Atomic Energy, Mumbai.
6	01-01-2004 to 12-10-2005	Research scholar , at CECRI Working area: Identification of hydrocarbon degrading bacteria by 16S rDNA gene sequencing and their role on corrosion of petroleum product pipeline
7	03-03-2003 to 31-05-2003	Worked as a Project Fellow , In M/s Protech Anodes and Alloy Engineer contract project entitled “Conducing survey and designs of CP system for the pipelines to be laid between HPCL Ghatkesar” and BPCL, Cherlapalli” Corrosion Science and Engineering Division, Central Electrochemical Research Institute , Karaikudi, India
8	04-03-2002 to 02-03-2003	Worked as a Project Fellow , In Indian Oil Corporation (IOC) Noida Sponsored project, entitled “Studying the causes of corrosion and suggesting remedial measures of internal corrosion in petroleum product pipeline between Kandla port and Bhatinda terminal (KBPL)” Corrosion Science and Engineering Division, Central Electrochemical Research Institute , Karaikudi, India.
9	01-06- 2001 to 28-02-2002	Worked as a Project Assistant . In IFS sponsored project, entitled “ Bioactive Compounds from marine Actinomyces ” Sri Sankara Arts and Science College, Enathur, Kancheepuram, India.
10	11-12-2000 to 31-05- 2001	Worked as a Lecturer in Microbiology, at Sri Sankara Arts and Science College, Enathur, Kancheepuram, India.

Research Publications:

International journals

Year 2011

1. Assessment of airborne bacteria and fungi in food courts. **A.Rajasekar** and R.Balasubramanian

Building and Environment, 2011, 46(10) 2081-2087 (Elsevier)

2. Biocorrosion inhibition of aluminium 2024 aeronautical alloy by ladder conductive polymer poly (*o*-phenylenediamine) **Rajasekar Aruliah and Yen-Peng Ting**

Industrial Engineering Chemistry & Research (ACS) 2011, 50 (4), 2040–2046 (ACS)

3. Role of Hydrocarbon Degrading Bacteria *Serratia marcescens* ACE2 and *Bacillus cereus* ACE4 on Corrosion of Carbon Steel API 5LX

Aruliah, Rajasekar; Rajasekhar, Balasubramanian; Joshua, VM Kuma

Industrial & Engineering Chemistry Research Manuscript ID: ie-2011-00709q (UNDER REVISION)

4. Characterization of Corrosive Bacterial Consortia Isolated from a Cooling Tower. **Rajasekar Aruliah, Yen-Peng Ting.**

- The manuscript has been submitted to **Industrial Engineering Chemistry & Research (ACS)**

5. Bioleaching of gold from mineral ores: A review. **A. Rajasekar**, R. Balasubramanian and Joshua VM Kuma - The manuscript under review

Year 2010

1. Electrochemical behaviour of *Bacillus cereus* ACE4 and *Serratia marcescens* ACE2 on aluminum 2024 aeronautical alloy 2024. **Rajasekar Aruliah, Yen-Peng Ting.**

Industrial Engineering Chemistry & Research (ACS), 2010, 49(13) 6054 - 60661

2. Characterization of corrosive bacterial consortia isolated from petroleum product transporting pipelines. **Aruliah Rajasekar**, Balakrishnan Anandkumar, Sundaram Maruthamuthu, Yen-Peng Ting, and Pattanathu KSM Rahman

Applied Microbiology and Biotechnology, 2010, 85 1175-1188. (Springer)

Year 2008

1. Electrochemical behavior of *Serratia marcescens* ACE2 on carbon steel API5-LX-60 in organic-aqueous phase. **A.Rajasekar**, S.Maruthamuthu and Y.P.Ting
Industrial Engineering Chemistry & Research 47, 2008, 6925-6932 (ACS)

Year 2007

1. Biodegradation and corrosion behaviour of *Bacillus cereus* ACE4 in diesel transporting pipeline. **A.Rajasekar**, T. Ganesh Babu S. Karutha Pandian, S. Maruthamuthu, N. Palaniswamy and A. Rajendran
Corrosion Science, 49 2007, 2694-2710 (Elsevier)
2. Role of *Serratia marcescens* on diesel degradation and its influence on corrosion
A.Rajasekar, T. Ganesh Babu S. Karutha Pandian, S. Maruthamuthu, N. Palaniswamy and A.Rajendran
Journal of Industrial Microbiology and Biotechnology, 34, 2007, 589-598 (Springer)
3. Role of corrosion inhibitor degradation and its influence on corrosion
A.Rajasekar, S. Maruthamuthu N. Palaniswamy and A.Rajendran
Microbiological Research, 162, 2007, 355-368 (Elsevier)
4. Biodegradation and corrosion behavior of *Serratia marcescens* ACE2 isolated from Indian diesel transporting pipeline.
A. Rajasekar, T. Ganesh Babu S. Maruthamuthu, S. Karutha Pandian, S.Mohanan and N. Palaniswamy
World Journal of Microbiology & Biotechnology, 23, 2007, 1065-1074 (Springer)
5. Bacterial degradation and corrosion of naphtha in transporting pipeline
A.Rajasekar, S.Ponmariappan, S.Maruthamuthu and N.Palaniswamy
Current Microbiology, 55, 2007, 374-381 (Springer)

6. Biodegradation of palmarosa oil (green oil) by *Serratia marcescens*, S.Mohanan, S.Maruthamuthu, N.Muthukumar, **A.Rajasekar** and N.Palaniswamy **International Journal of Environmental Science and Technology** 4 2007 279 (CEERS publisher)

Year 2006

1. Prediction of Corrosion Rate of Steel AP5LX Using Curve Fitting Method

A. Rajasekar, L. Rajendran, S. Maruthamuthu, N.Palaniswamy, A. Rajendran
Zaštita materijala (Material Protection) 47 (4) 2006.

2. Microbiologically influenced corrosion in dairy effluent plant B.Ramesh babu, **A.Rajasekar**, S.Maruthamuthu, N.Muhtukumar and N.Palaniswamy, **International Journal of Environmental Science and Technology** 3(2) 2006 159-166 (CEERS publisher)

Year 2005

1. Bacterial Degradation of naphtha and its influence on Corrosion

A.Rajasekar, S.Maruthamuthu*, N.Muthukumar, S.Mohanan, P.Subramanian and N.Palaniswamy, **Corrosion Science**, 47, 2005, 257 -271 (Elsevier)

2. Role of fungi on diesel degradation and its influence on corrosion of API 5LX

S.Mohanan, **A.Rajasekar**, N. Muthukumar, S. Maruthamuthu and N. Palaniswamy
Corrosion Prevention and Control, 52 (4) 2005, 123-130 (Maney)

Domestic journals

Year 2009

1. Effect of thermophilic sulphate-reducing bacteria (*Desulfotomaculum geothermicum*) isolated from Indian petroleum refinery on the corrosion of mild steel
B. Anandkumar, **A. Rajasekar**, G. Venkatachari and S. Maruthamuthu,
Current Science, 97(3) 2009, 342-349 (Indian Academy of Science, IISc, Bangalore).

Year 2005

1. Electrochemical behaviour of microbes on orthodontic wires
S.Maruthamuthu, **A.Rajasekar**, S.Sathiyarayanan, N.Muthukumar and N.Palaniswamy, **Current Science**, 89(6) **2005**, 988-996 (**Indian Academy of Science, IISc, Bangalore**).
2. Role of corrosion inhibitors on bacterial corrosion in petroleum product pipeline,
S.Maruthamuthu, S.Mohanan, **A. Rajasekar**, N.Muthukumar, S.Ponmarriappan, P.Subramanian and N.Palaniswamy, **Indian Journal of Chemical Technology** 12 (5), **2005**, 567-575 (**CSIR publication**)

Year 2003

1. Microbiologically influenced corrosion in petroleum product pipelines- A review.
N.Muthukumar, **A. Rajasekar** S. Maruthamuthu, S.Mohanan, S.Ponmarriapan and N.Palaniswamy, **Indian Journal of Experimental Biology**, 41 (2003) pp.1012-1022 (**CSIR publication**)
2. Anodic behaviour of biofilm on SS316
S. Maruthamuthu, **A. Rajasekar**, N. Muthukumar, L. C. Deepa and N. Palaniswamy, **Journal of Electrochemical Society of India**, 52 (4), **2003**, 140-144 (**Indian Academy of Science, IISc, Bangalore**).

Editorial Advisory Board

Journal Name: **Recent Patens in Corrosion Science**

From: 2009 – Till date

Awards

- **BEST PAPER AWARD** in 12th National Corrosion Council of India (**NCCI**) entitled “**Corrosion problems in fire protection system: A case study**” held at Visakhapatnam (A.P) from 20, **22-09-2004**
- **Senior Research Fellow (SRF)** awarded by **CSIR (Council of Scientific & Industrial Research)**, **2006**

Research Experiences

- Isolation & Identification of hydrocarbon degrading bacteria by molecular technique (16S rDNA analysis)
- Biodegradation of hydrocarbon degrading bacteria

- Screening and isolation of hydrocarbon degrading enzymes such as Aryl hydrocarbon hydroxylase from microbes.
- Biocorrosion control in petroleum products and degradation of corrosion inhibitor/biocide evaluation
- Elucidating Microbial Cell-Surface Interactions and Inhibiting Biofilm Formation for Biocorrosion Control
- A novel approach for the recovery of copper and precious metals from low-grade ores using a combination of bio-oxidation and bio-leaching techniques

Molecular Biology Techniques:

- ✓ **Extraction of genomic DNA**
 - Bacteria
- ✓ **PCR Based Techniques**
 - Amplification of 16SrDNA
- ✓ **Bacterial cloning**
 - Restriction Digestion
 - Ligation
 - Plasmid Extraction – Alkaline lysis method
- ✓ **Screening of degrading enzymes**

Instrument Handled

- PCR
- Gel Electrophoresis
- Epi-fluorescence microscope
- CLSM
- XRD
- SEM
- GC-MS
- FTIR
- NMR
- AFM
- Electrochemical Impedance and polarization techniques

Current work:

- Identification of novel indigenous potential bioleaching microorganisms including acidophiles, iron oxidizing, cyanogenic bacteria etc.
- Optimization of bio-oxidation and bioleaching for recovery of precious metals with high extraction efficiency;
- Cost estimation of bio-oxidation coupled bioleaching technology for commercial applications.;
- Demonstration of the effectiveness of the proposed bioleaching technology for the intended industrial application.

Future work:**Waste digestion by enzymatic hydrolysis**

An enzyme is a protein that acts as a catalyst. The enzyme is responsible for accelerating the rate of a reaction in which various substrates are converted to products through the formation of an enzyme-substrate complex. Bacteria have the capability of producing many different types of enzymes. They are living organisms that respond to their environment. In general, bacteria are capable of producing enzymes that degrade a wide variety of organic materials such as fats, oils, cellulose, xylan, proteins and starches.

The following types of enzymes are responsible for improve the efficiency of waste management:

- LIPASE: Breaks down fats and grease
- PROTEASE: Breaks down proteins
- CELLULASE: Breaks down cellulose
- AMYLASE: Breaks down carbohydrates and starches

Each wastewater treatment is unique, and the specific community of microorganisms is involved. This is known as "application-specific microbiology" is the preferred methodology to increase the efficiency of waste management. Main goal of the proposed work will be prepare the enzymes (lipases, proteases, cellulases) from microbes and are used for more efficient removal of organic in specific environment as waste digester (viable powder of enzymes). This efficiency is multiplied by native microorganisms are well grow as a biofilm specifically designed support media. Hence, we will plan to apply the enzymatic hydrolytic process to waste digestion.

The proposed plan of work:

- Isolation and identification of enzyme producing microorganism including bacteria/fungi from waste matter by molecular technique (16S rDNA gene analysis)
- Screening and quantification of specific enzymes (i.e. Lipases, proteases, cellulase and amylase) from the selected isolates
- Optimization of the selected bacterial/fungal isolates for high production of enzymes
- Mass production of enzyme production by using bioreactor plant
- Formation of each enzymes as concentrated viable powder for commercialization as waste digester

References

1. Dr. Rajasekhar Balasubramanian

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3. Dr. Shamsudeen Varisai Mohamed

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