**Balasubrahmanyam Avvaru** (M. Chem. Engg., Ph.D)

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**Senior Professional**

A multi skilled chemical engineer/scientist having 11 years of industrial experience in R&D programs of Refinery/ FMCG/ Speciality & Fine chemical industries. Broad experience in optimizing process-product-technology design. Proven research capabilities, coordinating, managing the R&D projects in MNC organization through stage gate process with effective interpersonal and communication skills.

**PROFILE SUMMARY**

* Proven competency in ideation of new product/projects, establishing the proof of concept experiments/ project execution/ implementation through due diligence from various stake holders such as business and technical teams.
* Experience in Process modelling &development and scaleup, equipment sizing and selection. Scaleup from lab scale to pilot scale (technology transfer), writing proposals for commercial scale operations.
* Building R&D Excellencein the team by building skills and competencies based on skill gap analysis.
* Generating Intellectual property rights in the form of patents and publishing papers in various international journals and reviewer for various reputed scientific journals.

**CORE COMPETENCIES**

* Expertise in process intensification tools such as cavitation technologies forvarious waste water treatment, Oxidative desulphurisation of liquid fuels, .
* Expertise in interfactial and colloidal science for Refinery operationsand FMCG product applications.
* Expertise in refinery processes such as desalting, oxidative desulphurisation technique, spent caustic effluent treatment methods.
* Petroleum feedstock charecterisation for various advanced carbon meterials.

**INDUSTRIAL EXEPERIENCE**

1. **Organization : Reliance Industries Ltd.** ([**www.ril.com**](http://www.ril.com))

**Designation :** Sr. Scientist/Sr. Manager-(ESPS, RTG, R&D)

**Period :** Dec-2012 to till date

**Acheivements at RIL:**

* Applications of Cavitation technology for petroleum refining industry; e.g., Spent caustic effluent treatment process (Merox process spent caustic & Cracker spent caustic), PTA effluent treatment & Oxidative-desulphurization etc.
* Advanced carbon materials from various Petroleum & Petrochemical feed stocks (Naphtha cracker pyrolysis tar) for the production of Needle coke, Graphite etc.
* Developed a new Flocculent (Poly-aluminium chloride) based technology for the effective treatment of refinery de-salter brine effluent.
* **Out of the box idea award winner**, RTG, R&D-Rewards & Recognition 2015-16
* Team member **(Desalter brine effluent treatment** project**)-** Received a special award from Technology COE, 2016-2017
* Power user of **NPDI** process in RTG, RIL (as a Business Transformation initiative)

1. **Organization : Hindustan Unilever Research Centre, Bangalore. (**[**www.hul.co.in**](http://www.hul.co.in)**)**

**Designation :** Research Scientist-Process Science

**Period :** Mar-2010 to Sept-2012

**Achivements at HURC-**

* Expertise in Interfacial and Colloidal (Surface) Science: Home & Personal Care products **-** Worked on various surfactant technologies such as LABSA (Linear alkyl benzene sulphonic acid), poly acrylates, alkyl hydroxymates and mixed surfactant technologies (LAS/PAS/MES) for designing of detergent powders & liquids.
* Lead three member team-Designed and commissioned the Tea processing pilot plant, equipment sizing/selection. Designed and commissioned 1 kL capacity skid mounted distillation unit for commercial production of tea aroma from its moisture condensate.

1. **Organization : Gujarat Fluoro Chemicals Ltd., Vadodara (**[**www.gfl.co.in**](http://www.gfl.co.in)**)**

**Designation :** Manger (Technical services)

**Period :** Jan-2009 to March-2010

**Achievements GFL**: (Manager in Process Research & Engineering Department)

* Worked as a group/project leader- carried out an extensive literature survey for various fluorine based products, preparing the process manufacturing and technical reports.
* Designed multiphase batch reactors & provided technical services to the pilot and semi-commercial production plants.Completed project technology documents for BDFMSC, TFEDMA, TFPropanol.

1. **Organization : USV (India) Pvt. Ltd. (**[**www.usvindia.co.in**](http://www.usvindia.co.in)**)**

**Designation** : Research Engineer (Process Engineer)

**Period**  : July-2003 to Sept-2004

**Achievements at USV (India): (**Research Engineer in CPRL lab**)**

* Designed & Commissioned multipurpose pilot plant for various API products, in consultation with UDHE (India) Ltd.
* Involved in the design of agitators/batch rectors of 1 KL & 2 KL size (Glass lined stirred tank reactor).

**ACADEMIC RECORDS**

* **Ph. D (Tech) in Chemical Engineering, U I C T (**formerly known as **UDCT)**, Mumbai University, Mumbai, India, (2004 - 2008).([www.udct.org](http://www.udct.org))

Research Supervisor : Prof. Aniruddha B Pandit, UICT

Thesis Examiner : Prof. Anurag Mehra, HOD, Chem. Engg. Dept., IIT Bombay.

PhD Thesis : *Studies in Cavitation Phenomena: Intensification in Localised Transport*

**Part A:** Modeling of bubble size distribution ofacoustic cavitation bubbles using acoustic emission spectra. These effects of cavitation will enhance the formation of free radicals, and better gas-liquid and solid-liquid mass transfer rates.

**Part B:** Process development and intensification aspects of leaching of Uranium from its ore (Narwapaher ore) using Sulfuric acid (H2SO4), Nitric acid (HNO3) medium, Ferric sulphate [Fe2(SO4)3] as a leachant and as well as oxidizing agent using acoustic and hydrodynamic cavitational reactors. The yield of uranium is calculated to be increased by 60% per unit energy input compared to conventional multiphase reactors.

* **Master of Chemical Engineering (M. Chem. Engg.)**, **U I C T** Mumbai University, Mumbai, India, July 2003, **First class with Distinction(67 %)**, **Grade-A** in research project, (2001 – 2003).

Research Supervisor : Prof. Aniruddha B Pandit, UICT

Thesis Examiner : Prof. Anurag Mehra, HOD, Chem. Engg. Dept., IIT Bombay.

Thesis title : *Ultrasonic assisted Liquid atomisation-Effect of liquid phase properties*

* **Bachelor of Technology in Chemical Engineering,** Bapatla Engineering college, Bapatla, Nagarjuna University, Andhra Pradesh, 2001, **First class with Distinction** (**Marks-78.1 %**) (1997 – 2001).(GATE 2001-All India Rank-167)

**RESEARCH PUBLICATIONS**

1. **Avvaru B.,** Patil, M. N., Parag, R. G., Pandit, A. B., “Ultrasonic atomization: Effect of liquid phase properties”, *Ultrasonics*, 44(2006) 146-158. (This work has been ranked as Top most 25 downloaded journal for about 2 years).
2. **Avvaru B.**, Roy, S. B., Choudhury, S., Hareendran, K. N., Pandit, A. B., “Enhancement of Leaching Rate of Uranium in the Presence of Ultrasound”, *Ind. Eng. Chem. Res.,* 45 (2006) 7639- 7648.
3. **Avvaru B.,** and A. B. Pandit, “Experimental Investigation of cavitational bubble dynamics under multi-frequency system”, *Ultrason Sono-Chem.,* 15(4), 2008, 578-589.
4. **Avvaru B.**, Roy, S. B., Choudhury, S., Ladola, Y. S., Hareendran, K. N., Pandit, A. B., “Sono-Chemical Leaching of Uranium”, *Chemical Engineering and Processing: Process Intensification,* 47(12), (2008), 2107-2113.
5. **Avvaru B.,** Pandit, A. B., “Oscillating bubble concentration and its size distribution using Acoustic Emission Spectra”, *Ultrason Sono- Chem,* 16 (1), (2009), 105-115.
6. Sravan K Suggu, **Avvaru B.,** Shyam Sundar P.,Deshpande, V. D., Shukla, S. R., Pandit, A. B., “Characterisation of Sono-chemical Reactor for Physico-Chemical Transformations”, *Ind. Eng. Chem. Res.,* 48 (2009) 9402-9407.
7. Ke-min Quan, **Avvaru B.,** Pandit A. B., “Measurement and Interpretation of Cavitation Noise in a Hybrid Hydrodynamic Cavitating Device”, *AIChE J*, 57(4), 2011, 861-871.
8. Y. S. Ladola, **Avvaru. B**, Roy, S. B., S. Chowdhury, K. N. Hareendran, S. V. Kadam, A. B. Pandit, “Uranium leaching under acoustic cavitation” Journal of the Mineralogical society of India, 44 (1), January 2010, 258-262.
9. Avvaru Balasubrahmanyam, Suresh B Iyengar, Sanjeev Katti, Current Knowledge and Potential Applications of Cavitation Technologies for the Petroleum Refinery Industry, *Ultrason. Sono Chem.,* 42 (2018) 493-507.

**Patents Applied**

* + - 1. “Process for separating pollutant from wastewater and system thereof”, **Avvaru Balasubrahmanyam,** Parasuveera Uppara (WO: 2106139626A1)
      2. “A process for recovery of organics from PTA wastewater using amine based extractants”. **Avvaru Balasubrahmanyam,** Parasuveera Uppara (patent filed)
      3. “A process for recovery of hydrocarbons from the desalter effluent using a polyaluminium chloride based flocculating agent”. **Avvaru Balasubrahmanyam,** Parasuveera Uppara, Vivek Raje, Vijayalakshmi Cheedipudi, Rahul Kumbhar (patent filed)
      4. “A process for recovery of hydrocarbons from desalter effluent using an ammonia based ionic liquid”, **Avvaru Balasubrahmanyam,** Parasuveera Uppara, Vivek Raje, Vijayalakshmi Cheedipudi, (patent filed)
      5. “Extractive desulphurization of linear light coker gas oil (LLCGO) by using acidic ionic liquids.” Rajesh Sharma and Balasubrahmanyam Avvaru (**DN20170108**)

**Presentations**

1. Delivered a lecture in BARC, Uranium Extraction Division, “Extraction of Uranium using Cavitational reactors”. Mumbai, 14 Dec 2007.
2. Invited as a guest speaker in International conference: **SELECT BIO-Flow chemistry India,** 22-23 January- 2015, Mumbai.

**Topic – Process Intensification: Cavitational flow reactors**

**Speaker- Dr. Avvaru Balasubrahmanyam**