

Dr.Gangagni Rao A**Sr. Principal Scientist**

CSIR-Indian Institute of Chemical Technology
(Council of Scientific and Industrial Research)
Ministry of Science & Technology, Government of India
Tarnaka, Hyderabad-500007, Telangana, INDIA

Landline +91-40-27191808
Mobile 09949010736
Fax
Email ID agrao@iict.res.in
Alternate Email ID gangagnirao@gmail.com
Alternate URL

**Bibliography****About**

- Twenty five years of experience in reputed industries, consultancies and R & D organizations.
- Specialized in the field of biomethanation (anaerobic digestion) and biological gas purification. Developed novel high rate anaerobic wastewater treatment processes such as UASB and AFFR applicable for Indian industrial complex organic liquid effluents and executed full scale high rate biomethanation plants based on UASB technology for the generation of biogas based power from spent wash (distillery effluent), Prehydrolysate liquor (rayon grade pulp mill effluent) and Maize effluent.
- Retrofitted dormant full-scale anaerobic plants by incorporating novel sulfide inhibition control mechanism and CO₂ based acidification system.
- Extensively worked on high rate biomethanation of organic waste and patented two high rate biomethanation technologies for the treatment of organic solid waste known as self mixed anaerobic digester (SMAD) and anaerobic gas lift reactor (AGR) and commercial plants based on these patents are working near Hyderabad, Ahmadabad, Bellary and Hubli in India for the treatment of organic solid waste.
- Developed & patented a technology called "BIOFILTER" for the purification of waste and off gases emanating from industry that could cause odour and affect the health of the people working in and living around the industrial clusters. A full-scale plant based on BIOFILTER is working at M/s SAA Tannery at Erode, TN, India for the deodorization of off gases emanating from drum yard section.
- Served as International Consultant- Bioenergy by UNDP-Egypt.
- Advisory consultant-biogas generation and purification for major companies such as M/s Ahuja Engineering Services, Secunderabad, M/s Fenix Process Technologies, Pune and M/s Rhodia Energy Services, France.
- Carried out advanced research in ERI, UCC, Cork, Ireland for the generation, up-gradation of biogas from grass for using as transportation fuel; Post Doc fellowship of EPA-Ireland in Bio-fuels, ERI, UCC, Cork, Ireland – 2008
- Published 42 research and review papers in peer reviewed SCI national and international Journals and he has four patents to his credit.
- Far-reaching skills – conceptualization, process development, scale up, commissioning and project management.
- Proficient in creating new ideas, writing and executing R&D projects in the area of anaerobic digestion and biological gas purification.
- Well versed with development of process know-how, process flow sheets and basic engineering in the area of anaerobic wastewater treatment and anaerobic digestion of organic solid waste.

Education

B.Tech (Chemical Engineering) from Andhra University, College of Engineering, Visakhapatnam.

M.Tech (Process Engineering & Design) from IIT, Delhi.

Ph.D (Environmental Science & Technology) from Jawaharlal Nehru Technological University (JNTU), Hyderabad.

Post Doc (Biofuels) from Environmental Research Institute (ERI), University College Cork (UCC), Cork, Ireland.

Employment

• Presently working as a Senior Principal Scientist and Professor (Engineering Sciences) in CSIR- Indian Institute of Chemical Technology (IICT), Hyderabad in Bioengineering and Environmental Sciences Division.

Senior Principal Scientist

(2010 – Till date)

Principal Scientist (2005 – 2010)

... more

Research Interests**Present Research**

- Wastewater treatment
Concept to commissioning of biological effluent treatment plants based on anaerobic (UASB, AFFR) and aerobic (activated sludge process, extended aeration)
- Gas treatment
Concept to commissioning of biological process for the removal of H₂S from biogas, odour control and VOC removal from industrial gases using bio-filters
- Solid waste treatment
Concept to commissioning of high rate biomethanation process for market & vegetable waste, municipal solid waste and poultry litter

Past Research

National Institute for Interdisciplinary Science & Technology (NIST), Trivandrum Senior Scientist

(1997 – 2005)

- Managed and executed turnkey assignments of Effluent treatment plants from concept to commissioning
- Managed and executed consultancy projects on EIA, ETP, air pollution control, odour control and biological waste management

Western Paques India Ltd(Presently, Global Environmental Engineering Ltd), Pune MANAGER (Anaerobic digestion Technology)

(1995 – 1997)

- Headed Technology division of Energy from waste projects (Biogas and power from spent wash, PH liquor, Maize effluent and Black liquor)
- Headed Build own, operate and transfer (BOOT) projects to run as independent profit centre

The Energy and Resources Institute (TERI), N.Delhi Research Associate

(Biomethanation)

(1993 – 1995)

- Headed Centre for biomethanation
- Developed UASB process for organic effluents
- Developed TEAM process for solid waste

National Aluminium Company Ltd (NALCO), Damanjodi Engineer (Chemical)

(1990 – 1993)

- Operated alumina refinery independently as shift in charge

Projects Involved

Alternate fuels group, TDT Division, DST- N.Delhi-Production of bio-ethanol from livestock organic waste by anaerobic digestion (2014 - 2017)

(SETCA); 12th Plan network project-Development of Sustainable Waste Management Technologies for Chemical and Allied Industries (2012-2017)

ISRO-GBP (ATCTM)-Long term measurement of Ozone, NO_x, SO₂,CO and total solar radiation at a remote site to study the emission fluxes and change in their concentrations (2009-2017)

Lee pharma-Hyderabad-Validation and estimation of impurity-E in voriconazole drug using IC

12th Plan network project-Membrane and Adsorbent Technology Platform for Effective Separation of Gases and Liquids (MATES)

CSIR-IICT, MLP-Environmental impact analysis & waste management

(03MLP0013)

ICMR-Removal of hazardous industrial toxic emissions at source by environmentally benign biotechnological method

Research Group Members

- Bharath Gandu
- Kranti kuruti
- Sameena Begum
- Sudharshan Juntupally
- Shalini N

Publications

- A.G.Rao, Kusum Lata, P.Raman, V.V.N.Kishore and K.B.Ramachandran Studies of Anaerobic Treatment of Synthetic Waste in a UASB Reactor, Indian Journal of Environmental Protection , 1997,17(5), 349
- Gangagni Rao, A., Gandu, B., Sandhya,K., Kranti, K.,, Shruti, A., Swamy,Y.V., 2013. Decentralized application of anaerobic digesters in small poultry farms: Performance analysis of high rate self mixed anaerobic digester and conventional fixed dome anaerobic digester. Bioresource Technology 144, 121–127.
- A.Gangagni Rao, Bharath. G, Y.V.Swamy "Mass transfer dynamics of ammonia in high rate biomethanation of poultry litter leachate", Bioresources Technology. Bioresour.Technol. 109 (2012) 234-238
- Sameena, B., Kiran, G., Gangagni Rao, A., Shruthi, A., Bharath, G., Kranti, K., Ramakrishna, M., Swamy, Y.V. 2015. Cooked and uncooked food waste: A viable feedstock for generation of value added products through bio-refinery approach. ChemicalEngineering Research and Design. 10.1016/j.cherd.2015.10.032.Policy, 2003, Vol 6, 66
- A.Gangagni Rao,K. Krishna Prasad, G.Venkata Naidu, N.Chandrasekhara Rao and Kuruti, K., Rao, A.G., Gandu, B., Kiran, G., Mohammad, S., Sailaja, S., Swamy, Y. V, 2015. Generation of bioethanol and VFA through anaerobic acidogenic fermentation route with press mud obtained from sugar mill as a feedstock. Bioresour. Technol. 192, 646–653. doi:10.1016/j.biortech.2015.05.104.

Patents

- A.Gangagni Rao, Johny Joseph, S.Surya Prakash, Annapura Jetty, P.N.Sarma "Self mixed anaerobic digester for the treatment of organic solid waste".
- A.Gangagni Rao, Johny Joseph,P.N.Sarma, R.S,Prakasham, S.V.Mohan, Y.V.Swamy, P.Saravana Biological filter for the removal of odour causing inorganic and volatile organic compounds from various processing sections of a tannery (applied for U.S and INDIAN patents, 2010)
- A.Gangagni Rao, Y.V.Swamy Anaerobic gas lift reactor for the treatment of organic solid wastes having high nitrogen (low C/N ratio) (applied for INDIAN and PCT countries, 2012)

- A.Gangagni Rao, K.Kranthi, G.Bharath, Sameena Begum, Y.V.Swamy Sequential High rate Acidogenic Anaerobic Reactor incorporating pre-treatment Process (SHAARP) for the generation of mixture of bio-ethanol and VFA from solid organic waste (applied for INDIAN patents, 2016)

Lectures

- Remunerative Decentralized waste management-A way forward for SWACHHA BHARATH, Invited lecture, 2016, FTAPCI.
- Energy from waste, Invited lecture-2016, Engineering Staff College of India, Hyderabad 2016.
- Biomass to biogas- Indian strengths and opportunities for projects in Africa in 8th CII-EXIM bank Conclave on India Africa Projects Partnership, N.Delhi, March, 2012.
- Technology cooperation for addressing climate change – a case study; Consultation on Technology cooperation for addressing climate change organized by MOEF, Govt. of India and UNDP at N.Delhi on 23rd and 24th September 2011.
- Disposal of sulfur dioxide generated in industries using eco-friendly biotechnological process, SGB University; work shop on Green Chemistry, Amravathi, 2010.

Awards

- • DST-Lockheed Martin Award- Among best 110 innovations across globe for SMAD-2012
- • Received IChE award "Hindustan Dorr-Oliver Award for Excellence in use of Science & Technology in Rural Development for the Year 2014".
- • Received Technology achievements Award-2014, Certificate of excellence Presented by Education Expo TV (EET) CRS, Research Wing for Excellence in Professional Education and Industry, N.Delhi
- • Shortlisted (one amongst four) for IChemE Global Awards 2014 in the category of Innovator of the Year Award sponsored by NES Global Talent. IChemE: The Institution of Chemical Engineers (IChemE) is the global professional membership organization has offices in Australia, Malaysia, New Zealand, Singapore and the UK.
- • Received IICT Technology Award – 2015 – Anaerobic Gas Lift Reactor (AGR)

Honours

- • Elected as FELLOW, INSTITUTION OF ENGINEERS (FIE), India, 2015
- • Selected by UNDP Seoul Policy Centre, Republic of Korea for the advanced training course on 'Waste to Energy for Developing Countries' that was held from 25 – 30November 2013 at Chulalongkorn University (CU) in Bangkok, Thailand. Green Technology Centre of Korea (GTC-K), Chulalongkorn University in Bangkok and UNDP Seoul Policy Centre supported the programme.
- • Member -Expert group for undertaking a scoping study of DISTILLERY INDUSTRY under GREEN CHEMISTRY initiatives Constituted Office of the Principal Scientific Adviser (PSA) to the Government of India
- • Selected for workshop on "Accelerated commercialization of Technology and Innovation" held in Pune (2010) by Venture Centre, CSIR, NSTEDB, Accelerator India and British High Commission
- • Life member of BRSI-LM-1809