Research Work

I believe Engineering research is all about converting today's Science into tomorrow's technology. Based on this belief, I have been involved in addressing challenges involved in addressing challenges posed in developing practical cost effective, energy efficient and environment friendly systems from a commercialization point of view, thereby attempting to bridge the gap between know-why and know-how. Presently my focus is on Process Engineering/Intensification and I have worked and am working on projects in the following areas:

UNMIXED COMBUSTION AND APPLICATIONS (LIKE CO_2 CAPTURE, HYDROGEN PRODUCTION, PROCESS HEATING ETC.)

SEAWATER DESALINATION (BASED ON FREEZE DESALINATION / HYDRATE DESALINATION)

PROCESS DEVELOPMENT BASED ON HYBRID TECHNOLOGIES FOR INDUSTRIAL AND DOMESTIC WASTEWATER TREATMENT

FOULING IN REFINERY SYSTEMS

GAS HYDRATE THERMODYNAMICS / KINETICS AND APPLICATIONS

POLYOLEFIN CO-CHLORINATION

WATER RECOVERY FROM FLUE / TAIL GAS GENERATED IN PROCESS INDUSTRIES

Summary of research achievements

1. Have secured funding till date to the tune of **~8.5 crores** (INR) from 2007 to 2022 **(9 projects)**
2. Projects have been funded by Government and Private funding agencies like DST-SERB, Ministry of Fertilizers, Aditya Birla Group, Centre for High Technology, Gail (India) Ltd., Thermax Ltd. and Bharat Petroleum Corporate R&D Centre.
3. Majority of the projects have an associated industry partner
4. Our work on a DST-Thermax funded project has resulted in development of a proof-of concept test rig to demonstrate a novel form of combustion called “Unmixed Combustion” for heat transfer applications. **This work is to the best of knowledge the first of its kind in India and also internationally**.
5. The work on Unmixed Combustion is presently being extended to the steam reforming process for hydrogen production. Funding was secured from DST-SERB in collaboration with BPCL Corporate R&D Centre. Funding has also been secured

under the DST-DBT Mission Innovation call for carbon capture (Funds sanctioned: Rs. 49,14,536/-). The work involves demonstrating Unmixed Combustion for conversion of CO to CO_2.

6. We have developed a new process route for desalination as part of a GAIL (India) funded project funded to the tune of Rs 3 82,21,000/-. Two patents have been filed as an outcome of this work. 1 Patent has been granted.
7. We secured funding from the Centre for High Technology to investigate fouling in refinery systems. The Total outlay of this project with Bharat Petroleum Corporate R&D Centre as partner was Rs. 3,23,20,000/- BITS Pilani share: 1,68,17,700/-.
8. We have secured funding of Rs. 63 lakhs from Birla Carbon to support 3 PhD students to work on recovery of water from the tail gas of Carbon black plants. One of the students enrolled a PhD has secured the Prime Ministers fellowship for his Doctoral research.
9. We have secured funding under the SPARC scheme to understand High Advanced High Temperature High Pressure Oxygen Storage and Release Materials (OSRM) for Unmixed Combustion
10. Doctoral thesis supervision (Total / Completed / Thesis submitted / Ongoing): 11/5/6
11. Have also supervised 10 Higher Degree Dissertations
12. Number of publications: 16 (in journals); Conferences (full manuscript in proceedings): 2; Conferences (abstract in proceedings/ oral presentation / posters / invited talks): 16
13. Number of patents (Filed / under examination / Granted): 4/1/3